

ADULT ADHD: EFFECTS ON STUDENT PERFORMANCE WITHIN THE ONLINE  
CLASSROOM

by

Freda Barnett-Braddock

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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## ABSTRACT

The purpose of this causal-comparative study was to determine the impact, if any, that adult ADHD has on student performance within the online classroom. The researcher sought to identify any underlying correlations which exist that will impact benchmark assessment grades (final exam essay), grade point average (GPA), and course completion rates for students who are highly likely to have ADHD when compared with their neurotypical counterparts. The 41 participants were adult learners who were enrolled in an online, general education course at a university located in the southeastern portion of the United States. Independent samples t-tests and Chi Square tests were utilized to assess if there was a significant difference in benchmark assessment grades (final exam essay), grade point average, and course completion rates for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Levene's test of homogeneity of variance was conducted to evaluate the assumption of equality of variances. No significant statistical differences were discovered. Although no significant findings surfaced in this study due to the limited participant pool, further research is needed as many adult learners unknowingly suffer from ADHD, but they are not armed with the necessary knowledge to overcome the obstacles which are present in the online environment. Conclusions from this study provide insight for educators, students, and the community as a whole for working with this demographic.

*Keywords:* attention deficit hyperactivity disorder, online classroom, classroom achievement, course completion, motivation, attention

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## Dedication

I would like to dedicate this book and my entire educational journey to my Lord and Savior Jesus Christ. It has only been as a result of God's grace and mercy that I have persevered thus far. There were many times that I wanted to throw in the towel and quit, but God reminded me that trials only come to make me strong. I would be nothing without His unchanging love and guidance over my life.

To my husband, Marcus, thank you for helping me to follow my dreams. I appreciate the quiet cheerleader role that you often embraced when I needed it. Your prayers sustained me on many dark days when I wanted to give up.

To my son, my hero, Jayden (Jay) William, there are no words to describe how proud I am of you. You have shown me more about unconditional love and patience than I ever imagined possible. Your gift of autism spurs me to want to spread more awareness and acceptance for all individuals who walk the face of our planet.

To my first love, my mom, Starlette Marie Vance, I thank you for all of the love and support that you have shown me since birth. You always encouraged me to embrace educational opportunities for they would be the doorway to my future. I love you for all of the sacrifices that you made for my sister and me over the years. You are not only my mother, but you are also my best friend. You were there when I needed to vent, or cry, or simply praise God for one more step along the way. You'll never know how much you mean to me.

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inspirational push and guidance to keep going when I was overwhelmed. You have laughed, cried, and prayed with me throughout this entire process, and my heart is simply overwhelmed because of your kindness. I love you for just being you, my T!

Finally, I dedicate this study to all of the individuals who suffer from ADHD. We are often misunderstood and treated unfairly simply due to a lack of knowledge and public awareness. I am committed to helping others understand our journey so that the path can become a little easier to travel.

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## CHAPTER ONE: INTRODUCTION

### Background

Online education has become increasingly popular today with the wealth of information available. According to the 2012 Survey of Online Learning, more than 6.7 million individuals are enrolled in a minimum of one online course. With the influx of adults moving into distance learning, the diversity of various demographics has increased as well. More and more students, particularly those with certain learning disabilities, have decided to embrace the anonymity that the virtual classroom often provides (Kuriyan et al., 2012; Meaux, Green, & Broussard, 2009; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008). Haynie (2014) revealed that numerous students with disabilities embrace the online environment in an effort to avoid the obstacles which are often found within the average brick-and-mortar environment. Students with Attention Deficit Hyperactivity Disorder (ADHD) are not excluded from this category. In fact, in 2005, it was discovered that attention deficit hyperactivity disorder was one of the most prevalent psychiatric disorders within the adult population (Faraone & Biederman, 2005). Seven years later, the prevalence of this disorder still held a significant presence of 5% in the worldwide population (Zhang et al., 2012). Interestingly enough, there is insufficient data to fully support the impact that ADHD has on the online learner.

College classrooms today are filled with multiple learners. In a typical undergraduate classroom which has 100 students, the probability is present that at least two of these students suffer from ADHD or another learning disability. In fact, the United States Department of Education (U.S. Dept. of Ed.) released a report in 2013 which revealed that 10.9% of the students who were enrolled in undergrad courses at institutions of higher learning across

America from 2007-08 had reported a diagnosed disability. Although initially this statistic could seem insignificant, the actual total has doubled in the past decade. The U.S. Dept. of Ed. further reports that nearly 2% of individuals enrolled in undergrad classrooms have an identifiable learning disability or ADHD. This equates to nearly 400,000 students. This demographic is growing in number and force as well. To this end, more and more students are seeking services to accommodate their learning impairments. However, these learners are not immune to opposition. According to Vickers (2010), many professors are reluctant to provide the accommodations that are needed, and some have openly criticized the secrecy that is often associated with disability services. These issues purport the need for more research within this area (Vickers, 2010).

Research has revealed that one's behavior can ultimately impact his/her ability to learn and acquire knowledge (Friedman & Zametkin, 2010; Sing-Manoux et al., 2005; Weyandt, et al., 2013). Therefore, it is imperative to carefully examine the behaviors of adults who have ADHD in an effort to positively shape their learning environment. While many non-traditional students embrace the virtual environment for the convenience and affordability purposes that this choice affords, distance learning creates numerous challenges that are not always a factor in the traditional brick and mortar environment. For instance, Phipps and Merisotis (1999) uncovered that most successful distance learners possess an innate level of motivation in order to complete their assignments. Friedman and Zametkin (2010) posit that this critical factor is not always present for individuals who suffer from ADHD. In fact, motivation deficiencies play critical roles in leading to poor success rates for online students (Friedman & Zametkin, 2010; Weyandt, et al, 2013). By examining the research and adopting proven strategies, strides can be taken to

help the student with adult ADHD overcome such obstacles. Instructors can furthermore enhance learning outcomes by tailoring instruction to meet the needs of all diverse learners as opposed to simply teaching to the average student (Friedman & Zametkin).

According to DuPaul, Weyandt, O'Dell, and Varejao (2009) and Weyandt and colleagues (2013) students who have ADHD have increased risk for poor academic outcomes, and they have increased prevalence for drop-out rates than their non-ADHD counterparts. In a study conducted by Heiligenstein, Guenther, Levy, Savino, and Fulwiler (1999), it was discovered that students who have been diagnosed with ADHD had lower GPA's, increased academic issues, and were more likely to have academic probation issues than students who have not been diagnosed with ADHD. The authors expressed that diminished individualized instructional methods may contribute to the deficiencies present between the two demographics (Heiligenstein et al.). DuPaul et al. further suggested that students who are highly likely to have adult ADHD tend to have poor coping strategies, inept coping skills, time management deficiencies, intrusive thoughts, and ongoing restlessness. Furthermore, Weyandt et al. (2013) stress the need for increased attention relative to social adjustments and emotional expressions. These issues must be adequately expounded in order to help these learners realize their full potential for success.

### **Theoretical Constructs**

This study encompassed a broad examination of the literature. The research embraced a plethora of sources including books, educational journals, Educational Resources Information Center (ERIC), and the world-wide-web (Internet). Numerous dissertations were evaluated and served as reference tools as well. Furthermore, federal educational legislation was integrated in the study. The wealth of information uncovered during the review of the literature revealed an



abundance of information for adult learners and the behavioral learning theory which relates to distance learning. Consequently, the behavioral learning theory was the central driving force behind research conducted by Friedman and Zametkin (2010). The researchers examined students using the cultural lens of the behavioral learning theory which was adapted by B.F. Skinner. Skinner (1963) believed that learning takes place in relation to observed behaviors. In essence, one's behavioral responses will be directly influenced by various stimuli. In order to fully understand behaviors, one should look at the causes and consequences of such actions (Skinner). This is important to note for students with ADHD as they are bombarded with stimuli around them; furthermore, they often have difficulties controlling their responses. In the study that was reviewed by Friedman and Zametkin, they discovered that adults with ADHD have dopamine deficits and therefore often experience learning complications. These deficits influence the initiation and control of various behaviors (Friedman & Zametkin). In a similar study conducted by Weyandt and associates (2013), it was deduced that college students with ADHD tend to suffer with executive mental functioning which ultimately leads to issues in organization, time management, attention, and social adjustments. This foundational research provided a platform for the featured study as non-traditional students who have adult ADHD do not always possess the necessary tools to realize successful outcomes in the virtual classroom (Haynie, 2014). More research is needed to form the appropriate connections between these learners and the issues that are present within the constructs of the virtual classroom.

### **Problem Statement**

Although many students with disabilities have reported that online education has many positive attributes, various struggles exist within this arena as well (Reaser, Prevatt, Petscher, &

Proctor, 2007; Meaux et al., 2009; Haynie, 2014). Adversely, many students find the convenience of the online environment to be quite enticing, while others find the enormity of self-motivation, concentration, and drive to be insurmountable obstacles (Haynie, 2014). For instance, Steinhausen (2009) revealed that adults who have ADHD suffer from psychosocial issues. This revelation can help theorize why the featured demographic would seemingly shun or hesitate to embrace online instruction as they fear the overwhelming complexities involved in this forum (Swartz, Prevatt, & Proctor, 2005; Haynie, 2014). In order to effectively evaluate the differences in performance outcomes for adults who are highly likely to have ADHD with their non-ADHD counterparts, statistical research was necessary. In fact, according to Gall, Gall, and Borg (2007), many educational research projects will utilize one variable. However, after careful examination of the literature, little was present which unilaterally joins the two areas of adult ADHD and online learning, particularly within the virtual classroom. Although Meaux et al. conducted similar research in which they used qualitative interviews to question 15 college students from a small university located in the southern portion of the U.S. in relation to adult ADHD, more questions than answers resulted from their study when looking at the impact of ADHD within the online classroom. In their study, all respondents completed demographic questionnaires and the Connor's Adult ADHD Rating Scale (long form - CAARS) in order to provide insight in the lives of the participants. The findings from their study were used to examine the behaviors which impacted their class performance and study habits (Meaux et al.). There is no doubt that this research reveals valuable insight for the brick and mortar environment. Nevertheless, paucity exists in the present research which connects the performance outcomes of students who are likely to have adult ADHD within the online

classroom. The featured plan sought to close the gap in this area by identifying such differences while providing solutions for future improvement efforts.

The study purposed to identify if adult online learners who are likely to have ADHD perform poorer in the online environment when compared to their neurotypical counterparts. When reflecting upon important statistical elements, many important elements come to mind. In this case, educational outcomes are important for academic success. Colleges routinely evaluate the effectiveness of their programs in relation to student completion rates. Although Taniguchi and Kaufman (2005) discovered that completion rates for nontraditional students are lower when compared with their traditional counterparts, newer research has shown that students can achieve success in online courses when certain variables are proactively addressed (Shea & Bidjerano, 2014). These implications reinforce the importance of the study as institutions of higher learning must evaluate the effectiveness of their individual programs while identifying any areas of improvement. Keeping in mind that students with disabilities often have various issues with course requirements (Farrell, 2003; Faigel, 1995; Denbo, 2003; Heiligenstein et al., 1999; Weyandt, 2013), it was beneficial to see if differences existed which would reveal areas for potential gains. According to Howell (2011), a cross-sectional study seeks to examine the prevalence of a particular outcome at one particular time utilizing different groups that share similar characteristics. This term is foundational to an educational researcher as he/she is often faced with the task of examining many relationships amongst various education-related variables. The proper examination in this area can provide benefits for adult online learners who may likely suffer from ADHD (Howell, 2011).

### **Purpose Statement**

The purpose of this study was to test the component of the behavioral learning theory (Singh-Manoux et al., 2005) that relates one's behavior (variable of interest) to his/her knowledge acquisition (dependent variable), controlling for student outcomes in an online, general educational class at a university located in the southeastern portion of the U.S. The researcher utilized strategies uncovered during initial research of the literature in this area and featured a causal-comparative design based upon ideas presented by Friedman and Zemetkin (2010), Meaux et al. (2009), and Weyandt et al. (2013). The researcher analyzed the Adult Self-Report Scale, benchmark assessment grades, GPA, and course completion rates for online adult learners who are highly likely to have ADHD versus those that are not highly likely to have ADHD.

By examining the previously discussed areas, one can begin to help adult students overcome the additional obstacles presented by online instruction due to complications from adult ADHD. The components which relate to the behavioral learning theory guided the research as one's behavior can directly impact his/her knowledge acquisition. The results of this research provided the capability to formulate strategies in which online learners who are highly likely to have adult ADHD can embrace in an effort to improve their educational outcomes (Howell, 2011; Haynie, 2014; Weyandt et al., 2013).

### **Significance of the Study**

As previously established, ADHD has far-reaching implications. The disorder not only impacts the individual's personal and educational life, but it can dramatically devastate his/her professional success as well. Kessler, Adler, Ames, Barkley, Birnbaum, Greenberg, . . . & Ustun

(2005) conducted research to assess the impact of ADHD on the adult worker. Their study encompassed a national household screening of 3,198 adults aged 18-44. The results were compared to the *DSM IV* and WHO (Work and Health Performance.) The results showed that 4.2% of the respondents had ADHD. In fact, the results revealed an average of 35 days of lost work time as a negative side effect. Additionally, the numbers were higher in the blue collar category; this demographic lost an average of 55.8 days. Consequently, those within the professional realm reported an average loss of 12.2 days, while technical workers lost 19.8. Finally, those that work within the service sector missed approximately 32.6 days. These statistics equate to a total of \$19.5 billion dollars of lost capital for the U.S. labor market. The researchers further purport that if individuals who have adult ADHD do not get the proper supports, they have decreased chances of completing their degree, and ultimately will contribute less to the overall economy (Kessler et al.)

More research exists which reveals the costs of ADHD on the American economy. In fact, Birnbaum et al. reported “the total excess cost of ADHD in the US in 2000 was \$31.6 billion” (2005, p. 195). They further revealed that out of this number, “\$3.7 billion was for the work loss cost of adults with ADHD and adult family members of persons with ADHD” (p. 196). In newer studies that were conducted, it has been determined that ADHD is not only an American problem, but this disorder has international financial repercussions. According to de Graaf and others, The WHO World Mental Health (WMH) Survey was distributed in 10 surveys to people between the ages of 18 and 44. There were 7,075 participants, and the response rate ranged from 45.9-87.7% amongst the 10 countries which were included. The researchers noted 22.1 days excessively missed by workers who were associated with ADHD when compared to

their non-ADHD counterparts. The countries most largely impacted were the U.S., Lebanon, Columbia, and Italy. It was concluded that more screening efforts for ADHD would prove beneficial (2008).

Additional research conducted by Kuriyan et al. (2012) revealed that educational and work outcomes can be severely impacted by one's ADHD status. Their study examined the occupational and educational statuses of individuals from the Pittsburgh ADHD Longitudinal Study (PALS). The study included 539 males, of which 326 were identified as having ADHD. Deficits in education and occupation were uncovered for the ADHD group. Additionally, high school achievement predicted later college pursuits. Furthermore, individuals with ADHD reported higher incidences of job loss and post-secondary academic issues. Research findings in this study further support the need to properly identify adults who are highly likely to suffer from adult ADHD in an effort to improve long-term academic and professional outcomes (Kuriyan et al.).

### **Research Questions**

The research questions for this study are shown below:

**RQ1:** Is there a difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

**RQ2:** Is there a difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult

ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

**RQ3:** Is there a difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

### **Null Hypotheses**

The null hypotheses for this study are shown below:

**H<sub>01</sub>:** There is no statistically significant difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**H<sub>02</sub>:** There is no statistically significant difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**H<sub>03</sub>:** There is no statistically significant difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

### **Identification of Variables**

The dependent variable for research question one was benchmark assessment scores which was measured on a continuous scale. Respondents were asked for their final exam essay score from a provided range. Data was coded to represent each range as follows: 1 (100-150); 2 (90-99); 3 (80-89); 4 (70-79); 5 (69 and below); 6 (Not Applicable).

The dependent variable for research question two was GPA, and this too was measurable on a continuous scale. Respondents were asked for their GPA score from a provided range. Data was coded to represent each range as follows: 1 (3.5 and up); 2 (3.4-3.0); 3 (2.9-2.5); 4 (2.4-2.0); 5 (1.9 and below).

The dependent variable for research question three was course completion rate which was a dichotomous variable measured on a categorical scale. Respondents were asked if they completed the course. Data was coded to represent each response as follows: 1 (yes); 2 (no); 3 (not applicable).

The independent variable, ADHD status, was measurable on a categorical scale. Respondents were required to indicate the frequency of occurrence of symptoms (0 = never; 1 = rarely; 2 = sometimes; 3 = often; 5 = very often). Based on this, if the respondent has 4 or more responses of sometimes, often, and/or very, the individual is considered to have ADHD. All surveys were scored by hand on three separate occasions to ensure the accuracy of findings. Following this, an ADHD (0- No ADHD; 1- Yes ADHD) status variable was created in SPSS 22 and each participant's score was manually entered.



## Definitions

In order to fully understand the connections of adult ADHD and online learning, pertinent terms and definitions have been provided below.

*Attention Deficit Hyperactivity Disorder:* ADHD “is characterized by a pattern of behavior, present in multiple settings (e.g., school and home), that can result in performance issues in social, educational, or work settings” (APA, 2013).

*Academic Adjustment Requirements:* Postsecondary schools are required to provide educational opportunities (appropriate adjustments) in an effort to avoid discrimination based on one’s disability. The adjustments can include modifications, note-taking assistance, recording devices, extended time for testing, reading devices, etc. (U.S. Dept. of Ed., 2011).

*Accommodation:* Alterations in procedures and policies which give individuals with disabilities equal educational opportunities. These accommodations are not required if such alterations will produce financial hardships or alter the program of service (Elliott, 2004).

*Extended Testing Time:* This involves giving extra testing time for students with disabilities as an educational accommodation (Elliott, 2004).

*Free and Appropriate Public Education (FAPE):* This law requires schools to furnish academic opportunities for general and special education. Students who have disabilities are guaranteed free support that non-disabled learners receive (NCLD, n.d.).

*Individualized Education Plan (IEP):* According to the National Center for Learning Disabilities (n.d.), the IEP is the document that tailors instruction to meet the individual needs of the student who has a disability. The IEP orchestrates the coordination of special education resources along with general educational requirements.

*Least Restrictive Environment:* This guideline states that students with disabilities should have their educational opportunities provided as much as possible with their non-disabled counterparts (Taylor, 2004).

*Modified Test or Assignments:* This alteration of the educational curriculum allows the student with a disability the opportunity to complete fewer problems or test items while still completing work that is comparable with the non-disabled learners. Alternate assessment items can also be formulated to give the student a greater chance to demonstrate his/her comprehension of the material, but in a different manner (NCLD, n.d.)

*Online Learning:* Also referred to as distance learning, this platform involves an interactive learning system in which the educational material is presented via a computer or some electronic network (Benson, 2002). Additionally, online learning can encompass collaborative environments, virtual learning, and e-Learning technologies (Conrad, 2006).

*Specific Learning Disability (SLD):* The SLD involves a disorder that encompasses at least one psychological process which could include language, math, and perception (Hale, Naglieri, Kaufman, & Kavale, 2004).

## CHAPTER TWO: LITERATURE REVIEW

### Introduction

All individuals possess various gifts, talents, and abilities. Furthermore, each individual has a preferred learning style in which he/she often gravitates. Research has shown that most people do not acquire knowledge simply from reading alone. With the advancements made in technology in the 2000's, increasing numbers of adult learners were embracing the Internet and various electronic media, including television, to further their learning efforts (Weiler, 2005). This trend continues today. In fact, according to a report released by Saad, Bustee, and Ogisi in 2013, "Five percent of all national adults say they are currently taking an online course of any kind . . ." Keeping these facts in mind, it becomes imperative that more be done to help learners reach their full potential regardless of the modality they choose to embrace. To this end, online learning or distance education often presents obstacles that are not always factors in the traditional classroom (Haynie, 2014). Knouse and Safren (2010) argue that online students must possess certain inherent qualities in order to self-motivate as no one is present to spur them to complete assignments as once experienced within the halls of the traditional high school. Furthermore, online adult learners who have been diagnosed with ADHD or who are highly likely to have adult ADHD must make a concerted effort to overcome the obstacles often associated with their disability in order to achieve success. Therefore, certain strategies should be embraced to help this demographic realize success (Knouse & Safren, 2010; Meaux, 2009; Weyandt et al., 2013).

With the downturn of the economy in recent years, many individuals have decided to return to school in order to pursue a degree (Online Learning Consortium, 2012). In fact, most

returning students would be described as non-traditional in the fact that they are endowed with many obligations: mother, father, worker, spouse, and community member. In essence, they possess varying responsibilities that often pull them in differing directions. Haynie (2014) predicts that continuing education efforts will continue within the online classroom. However, the instructor and student must remain mindful of the challenges which are often faced within the virtual classroom, particularly for students who have been diagnosed with a disability (Byrnes, 2009).

According to Knouse and Safren (2010), ADHD is considered as a psychological disorder that often manifests during childhood, but lasting impairments can extend throughout adulthood as well. In fact, research has shown that as many as 7 million adults could suffer from this disorder (Kessler et al., 2006). Vickers' (2010) study has shown that "In 2006, fully 5.6 percent of all Americans aged 3-21 and enrolled in public education (preschool through high school) were diagnosed with LD or ADD, up from 3.6 percent of that population in 1981" (p. 4). It is quite apparent that the prevalence for this issue is increasing and will have repercussions for many adult learners. Long-lasting issues that will often result from the disorder are inattention, hyperactivity, underachievement, impulsive outbursts, mood swings, decreased motivation, and negative cognitive behaviors. Therefore, it is often impossible for adults with ADHD to work effectively in an environment which relies heavily upon self-motivation, drive, and organizational skills; hence the perfect storm for the online classroom (Knouse & Safren, 2010; Kuriyan et al., 2012; Weyandt et al, 2013).

Information provided by the National Resource Center on ADHD (NRC) (n.d.) purports that adults with ADHD can often experience personal and academic issues. For instance, the

inability to effectively organize his/her time management skills and priorities can often create issues that the student is unable to handle. Additionally, loss of concentration, comprehension difficulties, and ineffective note-taking skills also serve as roadblocks for the featured demographic's propensity for success (Barkley, 2012; Barkley & Murphy, 2011). Meanwhile procrastination, poor sleeping patterns, and lacking future goals can often frustrate the adult ADHD learner and cause him/her great frustration (Weyandt et al., 2013).

The above elements warrant a pause for reflection as many adults who are highly likely to have ADHD are unaware, and they often needlessly suffer with struggles in the online classroom due to their disabilities (Haynie, 2014). Although children are diagnosed with this disorder in a seemingly increasing prevalence, adult ADHD is often unnoticed (Sibley, et al., 2012). According to the National Institutes of Mental Health (1996), many adults erroneously pursue treatment options for anxiety and depression, but they later realize that ADHD was the primary source of many maladaptive issues that they experience on a daily basis. After carefully examining childhood behaviors, personal interviews with both parents and significant others, physical tests, and psychological exams, more and more adults are learning that they have the characteristics of adult ADHD (NIMH, 1996). In a more recent study conducted by Harvard University and funded by the NIMH, it was discovered that approximately 4.4% of adults living in the U.S. have some prevalence for ADHD. These results further support the fact that numerous children who are diagnosed with ADHD, and those who remain unidentified, continue to suffer from these effects long into adulthood (NIMH, 2006).

In fact, research conducted by Quinn and Madhoo (2014) provide further insight into the importance of this issue as these scholars report that many times women go undiagnosed with

ADHD until they are well into their 20's and 30's. ADHD symptoms in girls and women usually present in the inattentive form which can encompass issues with peer relationships, self-esteem, depression, anxiety, and other maladaptive behaviors. Young girls are often overlooked because they do not cause major disruptions within the classroom as their issues are more internalized. It is often not until a woman is seeking help for her son that she begins to become more knowledgeable about ADHD and she actually seeks a proper diagnosis for unexplained behaviors in her life (Quinn & Madhoo, 2014).

Effective treatment options exist for adults with ADHD, but proper measures must be embraced to truly diagnose the severity of the symptoms which are present (Weyandt et al., 2013). The NRC (n.d.) suggests that a multimodal approach can often prove beneficial, especially for individuals who have comorbid conditions present which include additional behavior disorders, learning disabilities, and depression.

### **Federal Legislation**

Although adults who are highly likely to have ADHD may feel a bit overwhelmed with the realization of their condition (Barkley, 2012), supports are available to assist this demographic. There are federal laws which have been passed which are in place to help students with disabilities. Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990 are two such pieces of legislation. According to Section 504, it is unlawful to exclude, deny, or discriminate against any individual who has a disability if the entity receives federal assistance (U.S. Department of Justice, 2005). Within this document, various mandates are given to establish standards for postsecondary institutions of higher learning that are recipients of governmental funding. In particular, details on recruitment efforts,

admissions, academic fairness, housing, and financial factors which impact aid and employment efforts are defined (Denbo, 2003).

Further still, the Americans with Disabilities Act (ADA) in 1990, established more protection for people with disabilities. In fact, this piece of legislation has often been considered one of the most significant pieces of legislation for this group. This law had a wider scope by including entities that are not recipients of federal dollars. Under the auspices of Title II of the ADA, individuals with disabilities cannot be discriminated against by public organizations; this encompasses colleges, universities, and various programs under their direction (Nunez, Margulies-Eisner, Manheimer, & MacNeil-Stinson et al., 1996).

According to the U.S. Department of Education (2007), the ADA delineates disability as a mental or physical impairment that largely impacts one or more areas of an individual's life. This is pertinent to students with ADHD because the law encompasses mental and psychological disorders. A mental impairment has been defined broadly by including brain issues, mental retardation, emotional issues, and specific learning disabilities. Under this law, college students with adult ADHD or additional learning disabilities must receive reasonable accommodations.

In addition to the above legislations, the Individuals with Disabilities Education Act (IDEA) 2004 ushered in considerable changes within the primary educational realm as well. As a result of IDEA, school districts were mandated to provide a free appropriate public education (FAPE) for students with disabilities (National Center for Learning Disabilities, n.d.). Within this law is the provision to provide necessary supports and special education services to effectively meet the needs of all children. However, little impact was seen for the average college student and higher education as a whole as postsecondary schools are not compulsory

and do not have to provide a free appropriate public education. Consequently, IDEA 2004 provided several provisions for students with disabilities. However, it is primarily in the hands of local districts, states, and individual schools to adequately interpret the recommendations and regulations in order to implement the necessary adjustments. Nevertheless, IDEA 2004 has been effective in assisting college students who have been diagnosed with disabilities to effectively transition into college life. As Byrnes (2009) reported that secondary education must provide this demographic with the same accommodations and modifications that they were afforded in high school. Furthermore, schools that receive federal funds risk losing these precious dollars if ADA regulations are not enforced (Byrnes, 2009). It was the goal of the featured research to ensure that adults who are highly likely to have ADHD receive all of the supports necessary to fulfill their prime potential.

With the passage of the above laws, many schools of higher learning have expanded their scope of student services. According to Wolf (2006), many colleges and universities now have an Office of Disability Services which offers a plethora of services including assessments, tutoring, accommodations, and remediation strategies. The staff helps students ensure eligibility requirements while also developing a plan for appropriate accommodations. This will often entail direct intervention with faculty and staff to ensure appropriate accommodations are provided (Wolf, 2006).

Due to the complexities often associated with the previously discussed legislation, it is imperative that professors and support personnel become adequately knowledgeable in these areas to best assist adults who are highly likely to have ADHD within the online classroom (Thompson & Bethea, 1997; Denbo, 2003; Reaser et al., 2007; Weyandt et al., 2013). Quite



often, professors are not mindful of the requirements of Section 504 and ADA, and reasonable accommodations are often overlooked. Furthermore, research is present which reveals best practices that can assist in classroom modifications and teaching strategies. Barriers must be proactively overcome that could hinder adult learners who quite possibly suffer from ADHD. Thompson and Bethea (1997) conducted a study with 400 administrators and faculty at a large southeastern university. Their findings revealed that almost a decade after the passage of the ADA, only 18% of postsecondary professors had adequate knowledge of the higher educational regulations which relate to Section 504. Furthermore, only 50% were familiar with the ADA at all (Thompson & Bethea). Knowledge in legislation is still pertinent today as Krank, Jackson, Taylor, Anderson-Fye, and Floersch report that students with disabilities tend to have a higher propensity for dropping out due to lower academic performance outcomes. Furthermore, these students are often hesitant to disclose their disabilities to personnel for many reasons including fear and widely-accepted stigmas (2013). This reinforces the need for the featured study as many students with disabilities, particularly ADHD, lose interest in their courses and have increased drop-out rates (DuPaul et al., 2009; Kuriyan et al., 2012; Weyandt et al., 2013).

### **Theoretical Framework**

The featured review was tied to the Behavioral Learning Theory (Friedman & Zametkin, 2010; Skinner, 1963). Research has revealed correlations between one's behavior and his or her potential for learning acquisition (Skinner, 1963). This is an important area worthy of merit as certain behaviors could impact learning outcomes, either positively or negatively. A study conducted by Sing-Manoux, Hillsdon, Brunner, and Marmot (2005) discovered that the effects of

physical activity on the lives of middle-aged individuals would positively improve their level of knowledge acquisition.

Most would readily agree that instruction should be student-centered. This is evidenced even before the work which was conducted by Friedman and Zametkin (2010) and Weyandt and colleagues (2013). In fact, Flanagan and Harrison (2005) posited that proper testing and assessment measures are needed to appropriately identify intellectual abilities in order to improve any deficits. Research supports that educators should assess each individual student's needs and tailor instructional methods to meet each one accordingly. Individual differences should be examined while appropriate adjustments are made (Flanagan & Harrison).

When seeking to examine the behavioral learning theory in light of college students who are highly likely to have adult ADHD, it was important to examine the work of Malcolm Knowles (1984). This researcher posited that learning for adults is both experiential and reflexive. In essence, one's prior learning experiences will shape future outcomes (Weyandt et al., 2013). Knowles believed that adults experience affective outcomes when they learn something new, and they will often equate the learning process with positive feelings of worth. The scholar ascertained that adults were driven by intrinsic motivators for learning. His idea of andragogy was pertinent for the featured demographic as they often lack motivation to complete school assignments. Students who are likely to suffer from adult ADHD often need help in finding inner motivation to complete work when no one is there to remind them of upcoming assignments (Reaser et al., 2007; Weyandt et al., 2013).

The behavioral learning theory provided a framework for this review. By examining the related research, recommendations were formulated to assist the adult online learner who is

highly likely to have ADHD. Once the data is reviewed and the recommendations implemented, the adult online learner can begin to behave proactively in seeking to overcome the limitations associated with the learning disability (Reaser et al., 2007; Meaux et al., 2009; Weyandt et al., 2013).

### **History of Online Education**

Before one can effectively examine the differences and challenges which exist for an adult who is likely to have ADHD compared with their non-ADHD counterparts, the history of online education and the subsequent complexities related to this area of higher education must be established. Online education's roots can be traced back over a century when its parent form, distance learning, emerged via correspondence courses and low-tech devices (Holmberg, 1977; Matthews, 1999). The original purpose for this arena was to reach displaced populations by giving them educational opportunities which would not otherwise be available. Today, distance learning has grown to encompass multiple modes of instruction, including online courses. In fact, Allen and Seaman (2008) reported that approximately 83% of institutions of higher learning now possess distance learning platforms. During this same period, the Sloan Consortium discovered that online education had achieved a 17% growth when compared with a 1.2% outcome in traditional brick-and-mortar environments. This equated to an expansion of nearly one million learners in comparison to the previous academic year (Allen & Seaman, 2008). Furthermore, the survey that was conducted in fall 2009 revealed that approximately 5.6 million adults were registered for at least one online course amongst 2,500 universities nationwide (Allen & Seaman, 2010). In a recent report released by Allen and Seaman (2013) it was

discovered that more than 6.7 million students are enrolled in online courses. This is a new record for online education.

As within any area, growth often spurs many challenges. Wagner, Hassanein, and Head (2008) report that online education has experienced an increased demand in recent years. Even as late as 2013, Allen and Seaman purport that online learning is viewed as an integral portion of the educational offerings at institutions of higher learning by 69.1% of chief academic officers included in their survey. In lieu of this data, more concerns have emerged in relation to quality and delivery efforts (Eskey & Schulte, 2010; Allen & Seaman, 2013). Hsiao and Smith (2011) divulged details that quite often, professors do not devote adequate time to pedagogy when writing courses. These researchers affirm that effective online courses should possess many of the same characteristics of brick-and-mortar experiences. Sadly enough, this is not always the case within the virtual classroom (Hsiao & Smith).

As previously established, distance education in the 21<sup>st</sup> century has grown by leaps and bounds in recent years. Jacobs (2013) reports that universities have had to rise to meet the demands of lifelong learning as careers today are drastically different from those just 10 years ago. Because the average person changes career paths each decade, continued strides must be realized within the educational realm. Online instruction is well-equipped to handle evolutionary changes if specific steps are embraced to keep learning transformative. Generations today seek the applicability of knowledge in rapid pace. Because technological advancements have changed over the years, so must online education (Jacobs).

Student engagement is critically important in online courses. It is imperative that instructional designers provide multiple teaching modes to best meet the needs of the diverse

online learners. Students often equate course satisfaction with their level of interaction. Professors should seek innovative ways to keep students engaged by providing opportunities for class discussions and instructor feedback. In essence, ongoing dialogue is needed within the online environment for effective learning to occur. When students feel valued and connected to their professor, course participation, satisfaction, and achievement increase exponentially (Jacobs, 2013).

The above factors are critical to the potential outcomes experienced by many adults who are highly likely to have ADHD. Kim, Bonk, and Zeng (2005) as well as Jacobs (2013) communicate the importance of embracing continuous pedagogical strides in an effort to improve technology and the demands of various online learners. Professors must evolve from the role of facilitator to that of collaborative partner in order for all students to realize their full potential within the online environment (Jacobs, 2013). Ross-Gordon (2011) further describes the effective professor in the 21<sup>st</sup> century. In essence, professors should transform the way in which students view the world by challenging their cognitive processing and encouraging critical thinking and reflection. In short, online education must offer full support for all demographics, including those who easily face challenges in relation to course content, motivation, and instruction (Jacobs, 2013; Kim et al., 2005; Ross-Gordon, 2011; Weyandt et al., 2013).

### **Online Learning Today**

Online education has evolved in recent years to encompass more elements than the previous founders ever thought possible. According to Mazoue (2013), land-based educational opportunities are no longer the leading force within academia. A new alternative to the traditional classroom, and typical online environment for that matter, has emerged, massive open

online courses (MOOC). First coined in 2008 by Dave Cormier, MOOCs have evolved to lead the stage in educational resources. In essence, institutions of higher learning are embracing MOOCs and the free courses that are provided while giving students degree credits based on experiences. MOOCs would be beneficial to students with adult ADHD because they are tailored to more individualized instructional methods, which is the ideal format for one who has difficulty maintaining focus and lacks organizational skills (Weyandt et al., 2013). The MOOCs are designed using research-based philosophies that best optimize student engagement and learning (Mazoue, 2013). The momentum that MOOCs have enjoyed holds much potential for the adult who is highly likely to suffer from ADHD as the fears and obstacles associated with the typical online classroom are virtually eliminated (Haynie, 2014; Weyandt et al., 2013).

### **Student Achievement within the Online Environment**

As previously established, online education has seen increased gains in recent years (Allen & Seaman, 2008). Furthermore, the report released by Allen and Seaman in 2013 continued to reveal the trend in online course growth. Therefore, it is important to examine the potential effectiveness of online instruction and the impact it holds on overall student achievement within this environment (Parsons-Pollard, Diehl Lacks, & Hylton Grant, 2008). Succinctly, Allen and Seaman's 2013 report revealed that 32% of students were enrolled in at least one online course. Research has revealed areas in which education faculty can address student achievement within the online environment by using effective multimedia tools while making strides to increase student interactions. Interestingly enough, Mills, Yanes, and Casebeer (2009) reported that many faculty have fears associated with the online environment due to larger workloads, inept faculty support, technology savviness, and overall student learning

outcomes. The perceptions in this area were still present in Allen and Seaman's report (2013) in which it was revealed that most academic officers believe that online instruction takes more effort and involvement than the typical brick-and-mortar course. These factors alone encourage more examination of the perceptions in this area.

Research is present which analyzes the effectiveness of online education when compared with face-to-face (F2F) instruction. Driscoll, Jicha, Hunt, Tichavsky, and Thompson (2012) embraced a quasi-experimental design to determine the outcomes in student satisfaction and learning when comparing online education with traditional ground instruction. Their study involved 368 students who were "enrolled in three online and three F2F sections of an introductory-level sociology course" (p. 312). The professor, materials, and tests were the same in both environments. The researchers sought to compare student satisfaction and performance by examining scores on the mid-term exam and an additional assignment. Survey results revealed that students enrolled in the F2F sections had higher grade point averages and were taking more courses than students in the online platform. Furthermore, the online students were older and reported more working hours each week. It was discovered that students in the F2F sections had better assessment scores on both tests. However, reported levels of student satisfaction did not have significant differences (Driscoll et al., 2012).

The work performed by Driscoll et al. is important as it reinforces that online instruction can be as effective in providing successful learning outcomes as traditional ground (F2F) delivery formats if appropriate supports are present. Even though students enrolled in the F2F formats had slightly higher test scores, this could be explained by the impact that student expectations can have upon learning outcomes as students with higher GPA's tend to take more

ground classes. This trend explains the higher score outcomes in the F2F sections. Additionally, students in both learning environments reported equal levels of satisfaction with their learning outcomes. This is important to realize as naysayers exist which question the effectiveness of the online environment. Overall, it was concluded that no deficiencies exist in the potential effective outcomes which can be realized within the online classroom. In fact, most students who choose online courses are usually older and lead working lives outside the classroom. This often equates to lower grade point averages due to increased responsibilities. If certain measures are proactively embraced to keep students engaged with the material, deliberate efforts can be realized to design productive, satisfying online formats in which students have positive learning outcomes (Driscoll et al., 2012).

Additional research is present which examines the effectiveness of student achievement within the online environment. In order to uncover possible difficulties which could exist within the online environment, Amro, Mundy, and Kupczynski (2015) conducted a study using archival data by comparing achievement and demographics for students enrolled in online versus F2F formats. The researchers embraced multiple regressions and ANCOVA to perform data analysis in order to ascertain if age, gender, and ethnicity could predict course outcomes for a college algebra class in south Texas. The population that was examined included 22,219 students enrolled in college algebra in fall and spring 2010-2013. The sample used was  $n=8,234$ . The two methods of instruction were online and face-to-face (F2F). More students were enrolled in F2F format, 7,791, (41% male and 58.7% female) while only 443 students took the course online (30.5% male and 69.5% female). More females were enrolled in both formats of the course. Ethnicity was identified as Hispanic, Caucasian, or Other. F2F had an enrollment of 7,564



Hispanic students while 193 were identified as Caucasian, with the remaining 34 reporting as Other. The online format had a similar percentage in relation to demographic representation: 410 Hispanics, 27 Caucasian, and 6 identified as Other. Interestingly enough, the mean age of students in the F2F format was 25.14, and the mean age within the online environment was 26.95. The researchers further reported average grades for the two groups: “( $M = 2.98$ ,  $SD = 1.46$ ); male face-to-face students ( $M = 2.88$ ,  $SD = 1.47$ ) appeared to be lower than female face-to-face students ( $M = 3.05$ ,  $SD = 1.45$ )” (Amro, Mundy, & Kupczynski, 2015, p.11).

In order to adequately analyze the predictability of age, gender, and ethnicity within the online environment when compared with the traditional brick and mortar environment (F2F), the researchers embraced multiple regression analysis. The data revealed higher final grades for F2F students ( $M=2.98$ ) when compared with the online group. Additionally, females had higher grade averages than the males. It was also noted that more females were enrolled in online classes than males. Further still, the researchers discovered that the average age of online students was  $M=26.95$ ; this compares to a F2F average age of  $M=25.14$ . The researchers were unable to use age and gender as predictors of student achievement within the online course. This is supported by research conducted by Colorado and Eberle (2010). Additional research shared by Kupczynski, Ice, Gibson, Richardson, and Challoo (2011) aligns with the featured findings which argue that one cannot predict online learning outcomes by examining age and gender alone. Once more, it is important to note that data analysis revealed that students enrolled in F2F environments tend to have higher student achievement on test scores than students enrolled in online formats. This coincides with studies conducted by Amin and Li (2010) and Ary and Brunce (2011) in which they reached the same conclusions.

The work conducted by Amro, Mundy, and Kupczynski (2015) was important for this liturgical review as it provides insight on key differences between the online learning environment and the F2F format. A holistic approach and analysis must be embraced in order to improve the online learning results for all students, particularly for those who are highly likely to suffer from adult ADHD. By examining the research in relation to age, gender, and ethnicity, trends can be realized while formulating strategies to help this demographic overcome obstacles which could hinder completion efforts. It has been shown that success can be realized within the online realm; the key lies within integrating the necessary supports in order to do such (Amro, Mundy, & Kupczynski, 2015; Weyandt et al., 2013).

### **The Need for Uniformity in Identification**

Keeping in mind that online instruction holds many enticements for students who do not perform well in the traditional brick-and-mortar environment (Haynie, 2014), it is beneficial to examine specific characteristics for the featured demographic. Friedman and Zametkin (2010) and Weyandt and colleagues (2013) asserted that one's behavior can ultimately impact his/her ability to learn and acquire knowledge. This theory can be applied to online learners who are highly likely to have ADHD. In fact, Friedman and Zametkin (2010) performed a meta-analysis which inspected various research methods and studies that have examined the effects of adult ADHD. One study revealed that adults who suffer from ADHD have dopamine deficits, and they frequently share learning complications. These deficits influence the initiation and control of various behaviors. Research was conducted to analyze the behaviors of 53 adult ADHD participants and 44 adults in the control section. It was observed that punishment and rewarding events are influenced by dopamine pathways. These blockages can produce delayed satisfaction

and gratification in relation to learning outcomes for adults who have been diagnosed with ADHD. If adequate medications and/or modifications are not implemented when necessary, the students' learning outcomes can be significantly thwarted (Friedman & Zametkin).

Friedman and Zametkin (2010) further examined additional research that has been used in the diagnosis of ADHD in adults. The overarching theme was the need for greater uniformity. It was determined that additional factors must be eliminated before the appropriate ruling of ADHD can be truly determined. According to Friedman and Zametkin, previous studies have used the findings from childhood reports to diagnose adult ADHD. These scholars purported that more measures must be embraced to produce a reliable diagnosis for adult ADHD while also taking certain steps to decrease the devastating effects of this disorder (Friedman & Zametkin, 2010).

The report by Friedman and Zametkin (2010) was quite revealing by uncovering several key findings. In one study examined, individuals with lower dopamine levels had higher propensities for inattention. Therefore, they had an increased propensity to receive the diagnosis of adult ADHD. In addition, the adult ADHD participants reported lower levels of reward and less satisfaction in completing certain tasks. It was noted that the hindrance to the dopamine reward pathways negatively impacted these individuals. Furthermore, the adults with ADHD reported higher levels of anxiety than those in the control group (Friedman & Zametkin, 2010).

An additional study conducted by Sibley et al. (2012) further supports the need for increased uniformity in diagnostic measures. Their study embraced self and informant ratings for childhood and adult functioning in relation to ADHD. Within their sample, 200 people had been diagnosed with ADHD as a child while 321 were in the non-ADHD group. These scholars

discovered that parent ratings were more diagnostically accurate when compared with self-analysis. In essence, the researchers posited that quite often young adults that suffer from ADHD will underreport their issues while those who do not have ADHD are more prone to falsely identifying symptoms related to ADHD. These findings reinforce the issues associated with proper identification efforts within this area (Sibley et al.).

There are two emerging areas worthy of merit that can be directly connected to this review. The outcomes in the study can be used to ascertain why adults who are likely to have ADHD may experience difficulties within the college environment as they seek to increase knowledge acquisition. Adults with this disorder already face remarkable challenges in relation to learning. By embracing the data and research found within the study, concerted steps can be embraced to help these individuals overcome such hindrances. The psychological and educational communities should forge a unified front to combat the complications of identifying adult ADHD learners (Friedman & Zimetkin, 2010; Advokat, Lane, & Luo, 2011).

Another study further examines the need for greater uniformity in regards to identifying those with ADD/ADHD. Asbjornsen, Jones, Mukvold, Obrzut, and Manger (2010) conducted a study to examine the screening process for adults with ADHD. Their study investigated the actions of 28 incarcerated adult males. Various behavioral characteristics were examined including vigilance, attention changes, and other areas of cognitive functioning. The study revealed that 57% of the participants exhibited ADHD tendencies/characteristics. Correlations were identified between the self-reporting scales and results of the tests based on attention characteristics. The researchers concluded that the self-reporting scales could have an impact on

the identification, or in this case, over identification of adults with ADHD (Asbjornsen et al., 2010).

Further still, additional research is present which suggests a need for increased uniformity in ADHD identification. Garnier-Dykstra, Pinchevsky, Caldeira, Vincent, and Arria (2010) conducted a study which included 1080 college students. The group was divided into three categories: those with no ADD/ADHD diagnosis, those with a diagnosis but not presently on any medications, and those with a diagnosis that were receiving medicinal treatment. The Adult Self-Reporting Scale (ASRS) was utilized in the research. Respondents who had never been diagnosed with ADHD had lower scores when compared to those currently diagnosed with ADHD. However, approximately 10.3% of those participants not diagnosed with the disorder actually had ADHD symptoms (Garnier-Dykstra et al., 2010).

Finally, Gibbins, Weiss, Goodman, Hodgkins, Landgraf, and Faraone (2010) sought to examine the ADHD hyperactive/impulsive/inattentive subtypes in adults with ADHD. The QuEST study was utilized in order to assess their quality of life, effectiveness, safety, tolerability, and effectiveness. The participants included 725 adults who were diagnosed with having any ADHD subtype. Data was compared for 691 participants who were characterized as inattentive (IA), hyperactive/impulsive (HI), or a combination of the subtypes. The setting was 84 community treatment centers located in the United States and Canada.

The data for the study was provided by Shire Pharmaceuticals (Gibbins et al., 2010). The study adhered to the Good Clinical Practices and Declaration of Helsinki guidelines. The ADHD symptoms were assessed utilizing Attention Deficit Hyperactivity Disorder Rating Scale for DSM-IV (ADHD-RS-IV). This included a questionnaire administered by a licensed clinician.

Eighteen questions were given with answers being rated from absence of symptoms to severe reactions. Measures were drafted to assess whether the ADHD-HI subtype differed from the other types. The severity of the illness was also measured. Additionally, health and quality of life were assessed using the ADHD Impact Module for Adults (AIM-A). ANOVA analyses were used to compare the various subtypes. Standardized residuals were also used to categorize differences between the subgroups. Equality in testing standards and procedures were also examined to ensure no violations occurred.

The results showed that 279 participants were diagnosed as having inattentive symptoms, 389 with a combined subtype, and only 23 were labeled as hyperactive/impulsive. The ADHD-IA group had higher percentages of being diagnosed as adults. Also, more in this group were married. No subtype differences were found based on race and gender. The severity of illness was found to be worse in ADHD-C as compared to ADHD-IA. Inattention was deemed worse in the ADHD-C group than the ADHD-IA group. However, attention deficits were not noticeably significant across the three subtypes. No significant differences were found across the subtypes in regards to the number of days missed from school/work, doctor visits, vehicle accidents, and number of jobs held. Health Related Quality of Life (HRQL) was not significantly different in any of the subgroups. However, the ADHD-HI and Combined groups had more impairments in the General Well-being scale than the ADHD-IA group. In short, the Combined and ADHD-HI were closely related in most variables measured. Furthermore, no data was present to purport that the ADHD-HI group had better functioning than the ADHD-IA group (Gibbins et al., 2010).

This study shows that deficits in attention combined with hyperactive/impulsive behaviors can cause functional impairments in adults with ADHD. However, clinicians need to

establish a baseline for identifying manifestations of attention issues and the associated implications. These findings can be beneficial to the online learner as a means for formulating alternate behavior modification techniques. The professor should look for clues in regards to levels of performance and time on task. A team approach is needed to help the online learner overcome obstacles so that educational attainment can be reached (Gibbens et al., 2010).

### **The Correlation of ADD/ADHD and One's Overall Well-being**

After establishing the need for uniformity in identification measures has been established, the correlation for psychological health and overall physical health demands examination. Singh-Manoux, Hillsdon, Brunner, and Marmot (2005) argued that certain behaviors can impact knowledge comprehension and attainment. In their study, correlations were examined between the physical activity and cognitive functioning in middle-aged participants. Their study involved 10,308 individuals aged 35-55 who served as civil servants. Physical activity was classified by three levels: low, medium, and high. The participants' physical activity was examined during various stages of their lives over a predetermined period of time. Furthermore, cognitive functioning was examined later when the individuals were between the ages of 46-68. It was discovered that individuals who reported low levels of physical activity were later found to possess lower levels of fluid intelligence. In essence, the researchers concluded that adults who embraced minimal levels of activity also had minimally functioning cognitive skills (Singh-Manoux, et al., 2005).

The researchers further concluded that poor cognitive functioning correlates to higher morbidity rates. This is a critical factor that directly relates to an individual's overall health and well-being. Physical activity, even at minimal levels of leisure, can prove beneficial in regards

to cognitive functioning in older individuals. Small to moderate levels of activity have also demonstrated as beneficial in lessening the presence and effects of dementia as well as low-functioning cognitive levels (Singh-Manoux et al., 2005).

This article unveiled several important findings, several of which can be directly connected to this review. The findings in the study should be utilized to encourage physical activity in the lives of middle-aged college students. These small, yet concerted efforts can do much to help increase knowledge acquisition. As previously noted, adults with Attention Deficit Disorder already face various obstacles in regards to learning. By embracing the existing data, numerous proactive steps can be integrated to increase comprehension skills and knowledge attainment for middle-aged college students, particularly online learners (Singh-Manoux et al., 2005).

Finally, Bolton, Hughes, and Kessler (2008) conducted a study to examine the psychological and physical health factors associated with female college students who have ADHD and those that do not. The participants consisted of 192 students enrolled in a private college for females located in the Southeast. Eighty-four of the participants reported that they have ADHD while 108 were non-ADHD participants. The setting was a private female liberal arts college located in the Southeast. The participants were given an electronic survey. Demographic information regarding class year, ethnicity, grade point average, and college major were collected. The participants also listed their various disabilities, if any. Coping skills, stress level, and mental fatigue, and health were also assessed.

In an effort to analyze the results, the students with ADHD were matched with students that did not have ADHD based on race, age, and grade classification. The female students with



ADHD reported higher levels of stress than those who did not have ADHD. These students with ADHD responded that they experience difficulty when trying to concentrate and suffered from low self-esteem. The female students with ADHD also reported that they experienced greater physical fatigue and role overload than those that did not have ADHD. The study concluded that female students with ADHD need more attention to the behaviors that are affected by the disability as well as strategies for overcoming areas of difficulty including organization and stress levels (Bolton, Hughes, & Kessler, 2008).

As a result of this research, it is now recognized that more needs to be done to focus on the needs of female students with ADHD. Campus counseling centers should begin to provide the necessary support. Also, discussion and peer groups could be utilized to provide further assistance. A concerted effort must be made to overcome role overload and fatigue for these women (Bolton, Hughes, & Kessler, 2008).

### **The Impact of ADHD on the Adult Worker**

As noted above, ADHD has far-reaching implications. The disorder not only impacts the individual's personal life, but it can dramatically devastate his/her professional success as well. Kessler, Adler, Ames, Barkley, Birnbaum, Greenberg, . . . & Ustun (2005) conducted research to assess the impact of ADD/ADHD on the adult worker. Their study encompassed a national household screening of 3,198 adults aged 18-44. The results were compared to the *DSM IV* and WHO (Work and Health Performance.) The results showed that 4.2% of the respondents had ADHD. In fact, the results revealed an average of 35 days of lost work time as a negative side effect. Additionally, the numbers were higher in the blue collar category; this demographic lost an average of 55.8 days. Consequently, those within the professional realm reported an average

loss of 12.2 days, while technical workers lost 19.8. Finally, those that work within the service sector missed approximately 32.6 days. These statistics equate to a total of \$19.5 billion dollars of lost capital for the U.S. labor market. Unnecessary income and productivity are lost each year due to adequately treating people with Adult ADD/ADHD. Quite obviously, more must be done to provide these individuals with appropriate care and treatment options to minimize the impact of this disorder (Kessler et al., 2005).

In an additional study, Bernfort, Nordfeldt, and Persson (2007) discovered that adults with ADHD tend to have lower levels of performance success in the realms of education and work when compared to their non-ADHD counterparts. Similar findings have been revealed by Secnik, Swensen, and Lage (2005). Their study disclosed that adults who have ADHD usually have lower levels of academic achievement and have a greater propensity for unemployment. This group is also more likely to endure incarceration. Quite possibly correlations between substance abuse, psychiatric issues, and lower educational levels reveal possible connections with criminal acts (Bernfort et al., 2007).

Furthermore, a recent study conducted by Kuriyan et al. (2012) examined educational and work accomplishments for adults with and without ADHD. Their research revealed that adults who had been diagnosed with ADHD as children had lower post-secondary educational outcomes than their non-ADHD counterparts. Transition periods after high school were quite challenging for the ADHD group and most reported less structure, which increased occupational stress. Furthermore, it was discovered that less individuals in the ADHD group held a bachelor's degree when compared with their neurotypical counterparts. In short, greater efforts are needed

to help young adults who suffer from ADHD to successfully transition into post-secondary environments or the world of work (Kuriyan et al.)

### **Other Implications of the Disorder**

According to Harpin (2005), the impact of ADHD does not only impact the individual that has received the diagnosis. In fact, ADHD does not discriminate in its ability to wreak havoc and cause disruptions. The entire family of the individual is impacted as well. Parents, siblings, and other extended family members are touched by the disorder too. Sadly, marital strains are present in most cases. It is frequently difficult for the adult who has been diagnosed with ADHD to be a productive member of society if he/she does not receive the proper treatment and care. As previously established, inadequate care can filter directly into the working environment which will later impact family responsibilities as well. The disorder does not simply cease to have an impact once a person reaches adulthood. In fact, those that have not been properly identified as having the disorder will usually suffer the consequences of the disorder without adequately understanding the root causes for the major life issues. Not only can ADHD impact one's mental health, but the overall well-being of the individual can be influenced by high healthcare costs (Harpin, 2005).

### **The Possible Impact of ADHD on the Online Learner**

ADHD not only impacts an individual's personal and professional life, but his or her academic experiences as well. Sollman, Ranseen, and Berry (2010) effectively combine all of the previously discussed implications to show the possible impact that this disorder could have on the adult online learner. These scholars argued that many young adults today are inundated with information in regards to ADHD. In fact, they are often encouraged and enticed to seek this

diagnosis due to various incentives and rewards received as a consequence of having the disorder. Their research included 74 undergraduate young adult students who were in significant need of financial assistance. The researchers purported that most adults are privy to the information on the Internet that is linked with ADHD, and they can in fact produce false positive results. In fact, they suggested that there is often a tendency to sway the results of various psychological examinations, surveys, and neurocognitive tests. As predicted, the malingerers faked the results. They successfully replicated ADHD profiles when using the ADHD and Conner's Rating Scales. In order to overcome the disparate measures, the researchers cross-correlated the results to other predictive tests. The researchers concluded that more must be done to ensure the validity of the results so that true identifications could be made while properly treating the individuals who actually have a true diagnosis (Sollman, Ranseen, & Berry, 2010).

More research is present to examine the impact on the academic success of the adult with ADHD. Xenitidis, Paliokosta, Rose, Maltezos, and Bramham (2010) provide additional implications for adult online learners who have been diagnosed with ADHD. Their research studied the impact of an additional disorder on the adult student with ADHD. They examined 269 adult learners with ADHD and those with ADHD and ID (mild Intellectual Disability). The results revealed that students with a combination of ADHD/ID experienced more difficulties with comprehension and knowledge attainment. This subgroup consistently reported more learning problems, even over into adulthood. The group that did not have the additional factor of ID experienced small improvements in learning outcomes and study strategies over time. Furthermore, impulsivity seemed to decrease as they improved their ability to maintain focus while completing assignments (Xenitidis et al., 2010).

An additional study which sheds light on possible academic struggles that could be experienced by students who are highly likely to have adult ADHD was performed by Storm and White (2010). They sought to examine the effects of selective retrieval on the memory of adults with ADHD versus those who do not have ADHD. The participants included 80 students who were in undergrad studies in psychology. Forty of the participants had been diagnosed as having ADHD while 40 others had no diagnosis. The ADHD group was comprised of 28 females and 12 males. The non-ADHD group had 29 females and 11 males. Seventy of the participants were students enrolled in the University of Memphis. The remaining 10 were enrolled in Eckerd College. The participants underwent several tests to determine the impact of inhibitions on the ability to retrieve certain information. The participants in the study were given 48 exemplars that held high levels of taxonomic strength. Each category was subdivided, and the participants were instructed on retrieval practice for each subgroup. Two other assessments were given as well. In order to assist with recall, the participants were given category cues plus one letter stem and then two letter stems (Storm & White).

There were three phases in the process: study, practice for retrieval, and the actual test. The groups were presented in random order, and no two consecutive pairs were given. After being shown the exemplar and related cues, the participants verbalized the exemplar so that their responses could be recorded. The initial practice was followed by a distractor that lasted 10 minutes. Finally, the test was given while giving the participants 30 seconds to view the exemplars in order to recall the items. Another test was given in which the participants received stem cues to assist in recall. The responses for both assessments were recorded by the examiner (Storm & White, 2010).

Storm and White's results showed that both groups performed relatively the same during the practice sessions. The ADHD group was able to retrieve 89% of the exemplars while the non-ADHD group retrieved 91% of the memories correctly. During the actual testing, the non-ADHD group performed a little better after receiving practice on retrieval of the exemplars. After all analysis was conducted, it was deduced that the non-ADHD participants had poor effects from retrieval-induced forgetting. It was concluded that ADHD participants experience problems in regards to decreases in inhibitory control for memory (2010).

The Storm and White study shows that individuals with ADHD tend to experience difficulty in regards to memory recall when retrieval-induced activities are present. These findings are significant in the fact that a lack of control of inhibitors can adversely impact the individual with ADHD in various aspects, but particularly recall. This fact is beneficial to note for the online learner so that students can remain cognizant of apparent distractions which can impede the learning process. The inhibitory deficit can also have implications on the forming of other intrusive memories that take place after a traumatic event. The individual with ADHD has been found to have difficulties with eliminating intrusive thoughts which can impact memory recall and recognition in other areas. This is a fascinating area of concern as the average online learner is already subject to various distractors. A deliberate effort must be embraced to minimize the possible results of decreased academic performance due to inhibitory retrieval processes (Storm & White, 2010).

Furthermore, Meaux, Green, and Broussard (2009) performed a study to examine the factors that help and hinder college students with ADHD. The participants consisted of 15 college students that have ADHD. The setting was a small public university in the southern part

of the United States. The participants were given a demographic questionnaire and Conner's Adult ADHD Rating Form-Long Edition. A semi-structured interview was then conducted to examine the various living experiences of the college students. Follow-up interviews were later conducted to clarify previous comments. The interviews were transcribed verbatim. Field notes were also included to provide additional details. The results revealed three themes: insight into ADHD, life management skills, and utilization of supportive services. All of the themes provide information on issues that hinder and assist college students cope with ADHD.

The first theme covered the covert and overt behaviors. Many participants confessed to feeling different due to their disability. They reported to initially trying to keep the diagnosis a secret from others. The lack of knowledge about ADHD made life more difficult and confusing. The participants reported improvements as they learned through various experiences, sought more information, acknowledged the disorder, and opened up to others (Meaux, 2009).

Another theme covered during the study was life management. The ADHD symptoms and addictive behaviors caused issues in regards to life management. Poor time management, attendance, and organizational skills were issues that seemed to persist for the participants. Female participants reported having issues in regards to impulsivity. This would in turn create relationship issues. Addictive behaviors also posed as a problem for students and hindered attendance efforts. Some male participants reported to missing class on several occasions due to their intense involvement with video games. Class scheduling was often an issue as well. Students had to be proactive and schedule class times that were conducive to their learning abilities and behavior patterns (Meaux, 2009).

The third theme was in regards to the utilization of resources. Parents, friends, professors, advisors, and disability services were useful tools in which the participants must embrace. Hindrances occurred when the students actively chose to dismiss these resources. Many reported to being oblivious of the various resources available that would assist their college efforts. Many felt as if they were too old to receive assistance and therefore did not utilize the services. The participants reported that friends provided social support as well. They often reminded the students of due dates and assignments. Finally, the students reported that a few utilized the support available from their professors. The participants reported that many professors provided phenomenal support in regards to accommodations. Those that utilized disability services received note taking assistance, tutoring services, and individualized accommodations (Meaux, 2009).

Glutting, Monaghan, Adams, and Sheslow (2002) provide more insight for the featured study. They posit that college students with ADHD differ from the general population of people who have adult ADHD as the former group has the propensity to experience academic success if armed with the appropriate tools. However, this is not the case when this demographic is compared with non-ADHD students. In fact, Lee, Oakland, Jackson, and Glutting (2008) revealed in their study that college students with adult ADHD have an increased risk for poor academic achievement, instability with their emotions, and increased prevalence of dropout rates when placed in comparison with their non-ADHD counterparts. This finding was true several years earlier in a study conducted by Barkley et al. (1990). That study communicated that college adults who have ADHD have a lower tendency to meet high levels of educational attainment when compared to the non-ADHD group. In fact, only 5% of the adult learners with



ADHD completed college when compared to the 41% in the non-ADHD group (Barley et al., 1990). A similar study conducted by Heiligenstein et al. (1999) provides further insight into the featured comparisons for adult college students with ADHD vs. non-ADHD. Their findings disclosed that adult college students with ADHD had a decreased grade point average (GPA) when compared with their non-ADHD counterparts, 2.5 vs. 3.2. Additionally, the ADHD group had an increased likelihood to experience academic probation, 38% vs. 7%. Finally, as a whole, the ADHD group had increased incident reports for academic issues compared with the control group, 14% vs. 10% (Heiligenstein et al., 1999). Research in this area is still reflective today as the study conducted by Kuriyan et al. (2012) also discovered decreased educational and work outcomes for individuals who suffer from ADHD. In fact, adults who had been diagnosed with ADHD as children were less likely to attain post-secondary degrees, and they had more job loss than their non-ADHD counterparts.

These studies show that there are factors that both hinder and help the college student with ADHD. By utilizing the knowledge gained from these studies, professors can begin to tailor instruction to meet the needs of all learners. The work performed by Meaux et al. (2009), reiterates that more efforts can be embraced to increase the awareness of ADHD while improving coping strategies.

### **Summary**

Several conclusions can be drawn as a result of the featured review. According to Stone, Boon, Fore, Bender, and Spencer (2008), and Shea and Bidjerano (2014), student comprehension can be improved when intervention strategies are implemented. After reviewing the literature in this area, new strategies for student comprehension should be formulated and

embraced to elicit moderate gains within the classroom environment. For example, more should be done to encourage these students to eliminate distractions while embracing effective study techniques as they seek to complete course work. Since there is limited research available on improving reading comprehension for older students, more should be done to address the academic concerns for students with ADHD (Quinn & Madhoo, 2014; Stone et al., 2008; Weyandt et al., 2013).

It has been established that more must be done to remain proactive in properly identifying individuals who are highly likely to suffer from adult ADHD. Research has shown that with the necessary supports, this demographic can have improved outcomes (Harpin, 2005; Kessler et al., 2005). By examining the commonalities and differences of all students, one can begin to cultivate the positive areas and restructure those areas that require more attention. It has been noted that standard interventions are not always the best strategy. A unified front should be forged to accurately identify adult learners in this demographic so that the proper supports can be implemented (Bell et al., 2011; Reaser, Prevatt, Petscher, & Proctor, 2007; Weyandt et al., 2013).

Finally, it was imperative to embrace efforts which closed the gap in the area of online education and adult ADHD. Limited research existed that succinctly married the impact of online education with the adult learner who suffers from ADHD. This study sought to identify challenges for students within this demographic while formulating strategies for addressing each one. Xenitidis et al. (2010) adequately compiled all of the assumptions and recommendations discussed in this review. They recommended that additional side effects of the disorder be examined. It is increasingly important that students and instructors begin to embrace the

research available to best meet the needs of all learners, particularly adult learners who suffer from ADHD within the online classroom. This study was designed to assist educators in helping students who suffer from adult ADHD to reach their maximum potential (Weyandt et al., 2013; Xenitidis et al., 2010).

The featured literature review established a solid foundation for this study. Research has revealed the critical importance of helping adult college students who are highly likely to have ADHD gain access to the necessary supports which can help them reach their highest level of potential. ADHD is a real challenge for individuals who face this battle each day (Bartlett et al., 2010; Xenitidis et al., 2010). The online environment poses additional obstacles as well (Amro et al., 2015; Driscoll et al., 2012). Medication alone cannot help solve the plethora of problems experienced by adults who suffer from ADHD, and therefore it is imperative to extend research efforts in this area (Advokat et al., 2011).

### **CHAPTER THREE: METHODOLOGY**

Attention Deficit Hyperactivity Disorder (ADHD) “is characterized by a pattern of behavior, present in multiple settings (e.g., school and home), that can result in performance issues in social, educational, or work settings” (APA, 2013, para. 1). In recent years, it has been discovered that ADHD is one of the most prevalent psychiatric disorders within the adult population (Faraone & Biederman, 2005). Interestingly enough, Knouse and Safren (2010) reported that many adults go years without a proper diagnosis. In fact, over 7 million adults (about 4.4% of the world’s population) suffer from ADD/ADHD, but many have gone unidentified and undiagnosed (Knouse & Safren, 2010). This information was foundational for the featured study as it has been shown there are certain characteristics and behaviors that can be directly correlated to one’s behavior and knowledge acquisition (Sing-Manoux et al., 2005; Friedman & Zametkin, 2010; Weyandt et al., 2013). Keeping the above characteristics in mind, the necessity for this study was further purported as there is a gap in the present literature which connects benchmark assessments, GPA, and course completion rate of students with adult ADHD and their academic performance. The featured research sought to close the gap in this area.

#### **Design**

A causal-comparative design was embraced for this study. Gall, Gall, and Borg (2007) posit that such design methods allow one to ascertain if differences exist among certain groups. Furthermore, Campbell and Stanley (1963) suggest that researchers can use causal-comparative designs when looking for cause-effect relationships for independent and dependent variables. The researcher could not randomly assign participants to certain groups because data was

examined after the effect on the variable had already transpired. The causal-comparative design is often embraced by practitioners and those with educational investments (Gall et al., 2007). The causal-comparative design is often embraced by practitioners and those with educational investments (Gall et al., 2007). Research by Rovai, Baker, and Ponton (2013) further establish the validity of using the causal-comparative design in this study because the sample size contained 30 or more participants.

By examining the featured statistical differences in benchmark assessments (final exam essay), GPA, and prior course completion rates, the researcher has begun to formulate strategies to help adult students overcome the additional obstacles presented by online instruction due to complications from adult ADHD. The components which relate to the behavioral learning theory guided the research as one's behavior can directly impact his/her knowledge acquisition. The results of this research further provided the capability to formulate strategies in which adult online learners who are highly likely to have Adult ADHD can embrace in an effort to improve their educational outcomes (Friedman & Zemetkin, 2010; Howell, 2011; Weyandt et al., 2013).

### **Research Questions**

The research questions for this study centered upon the primary aim of the experiment: to ascertain if students who are highly likely to have adult ADHD (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale) perform poorer in online classes than their neurotypical counterparts. The researcher sought to examine if there were differences in the areas of benchmark assessments (final exam essay), GPA, and prior course completion rates for both of the featured groups.

The research questions for this study are listed below:

**RQ1:** Is there a difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

**RQ2:** Is there a difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

**RQ3:** Is there a difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

### **Null Hypotheses**

According to Kessler et al. (2005), adults who score 24 or greater on the Adult ADHD Self-Report Scale based on the 18 question battery are highly likely to have adult ADHD. In the paper version of the ASRS, the respondent is highly likely to suffer from ADHD if four or more checks have been indicated within the shaded region of Part A on the ASRS. This score served as the benchmark to differentiate between the two groups. Thusly, the researcher formulated null hypotheses based upon the above featured areas:

**H<sub>0</sub>1:** There is no statistically significant difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or

more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**H<sub>0</sub>2:** There is no statistically significant difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**H<sub>0</sub>3:** There is no statistically significant difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

### **Participants**

A convenience sample was utilized for this study. The participants (n=41) were college students enrolled in an online freshman introductory class which lasts for 8 weeks. The researcher requested that all professors place a link to a survey for the Adult ADHD Self-Report Scale (ASRS) within their course along with a letter requesting voluntary participation in the study. In the winter of 2013 until spring 2014, the featured institution had an approximate student population of 74,000. This total body was representative of all 50 states and 90 countries as well. The student body population consisted of 58% female students and 42% males with Caucasians leading the race enrollment at 50%, while African Americans encompassed 17%. (Twenty-four percent of the student body's ethnicity was unknown.) The remaining ethnic groups included Asians 1%, Hispanics 2%, and multi-racial 2%. Furthermore, 3% of the student body identified as non-resident/alien status. The researcher examined the course benchmark

assessment scores, completion rate, and GPA for students who are highly likely to have adult ADHD and those who are not highly likely to have adult ADHD. The learning outcomes/performances of each group were analyzed for differences. All students that transfer or enroll into the School of Education are required to take an introductory 8-week course, so the sampling represented a diverse population. All sections of this course were given online. Therefore, a diverse demographic aided in the importance of the study.

### **Setting**

The setting was the virtual, online classroom of a brick and mortar university that is physically located in the southeastern portion of the U.S. However, since online sections alone were utilized for the study, the students were located across the United States. In fact, many of the students enrolled in the university are active-duty military. Therefore, some students of the students could have been located overseas in various countries. This lead to a larger variety of subjects in regards to ethnicities and socio-economic variables.

### **Instrumentation**

The researcher utilized strategies uncovered during initial research of the literature in this area and featured a causal-comparative design based upon ideas presented by Friedman & Zametkin (2010), Meaux et al. (2009), and Weyandt et al. (2013). The researcher analyzed the Adult Self-Report Scale, benchmark assessment scores, GPA, and course completion rates for online adult learners who are highly likely to have ADHD versus those that are not highly likely to have ADHD. To ensure reliability and validity for the study, the researcher used the Adult ADHD Self-Report Scale (ASRS) Symptom Checklist and scoring system as a benchmark to identify students who were highly likely to have ADHD. “This tool was developed in



conjunction with the World Health Organization (WHO), and the Workgroup on Adult ADHD that included the following team of psychiatrists and researchers Dr. Lenard Adler, Dr. Ronald C. Kessler, and Dr. Thomas Spencer” (Kessler et al., 2005, p. 3). The scale has been validated using the National Comorbidity Survey cohort as well as in well-characterized adult ADHD populations. Internal consistency of symptom scores on each scale was assessed by Cronbach's alpha. “Agreement of raters was established by intraclass correlation coefficients (ICCs) between scales” (Kessler et al., 2005). In fact, it was shown that the internal consistency was high for both groups: the rater-administered and patient versions. Furthermore, “the ICC between scales for total scores and for inattentive and hyperactive-impulsive symptoms were also high. There was also substantial agreement for individual items and significant kappa coefficients for all items ( $P < .001$ )” (Kessler et al., 2005). The featured instrument holds adequate validity for the featured study as “internal consistency reliability of the continuous ASRS Screener was in the range .63–.72 and test-retest reliability (Pearson correlations) in the range .58–.77” (Kessler et al., 2005).

The Adult ADHD Self-Report Scale-V1.1 Screener (ASRS-V1.1) was originally created to serve as a screening tool for ADHD in adults over the age of 18. The first six items are reflective of characteristics reported in the DSM-IV which describe manifestations of adult ADHD. The normal completion time for the first six items is one to two minutes. Individuals are instructed to use a Likert scale to assess their frequency of various symptoms (0 is never; 1 is rarely; 2 is sometimes; 3 is often; 4 is very often). If the person has four or more responses chosen in the darkly shaded area of copy-righted screener (Part A of the ASRS Symptom

Checklist), then he or she is highly likely to suffer from adult ADHD (Adler et al., 2006; Kessler et al., 2007).

Previous studies conducted by Hines, King, and Curry (2012) have implemented this scoring method and report that the ASRS “. . . showed a sensitivity of 1.0 and a specificity of 0.71. The high sensitivity suggests the ASRS-V1.1 rarely misses adults with ADHD. The moderately high specificity and negative predictive value of 0.99 suggest that the ASRS-V1.1 is successful at not identifying someone with adult ADHD if he or she does not have it” (p. 851). Additional studies exist that justify the reliability and usage of the ASRS in the featured study. In research conducted by Gray, Woltering, Mawjee, and Tannock (2014) which utilized the ASRS to compare self-report symptoms with assessments made by significant indicators, it was concluded that most respondents who had been previously diagnosed with ADHD, and were registered with the Office of Disability Services at their college, actually had symptoms consistent with ADHD based on Part A of the ASRS (98%). Based on these parameters, it can be safely deduced that none of the students in the featured study will be falsely identify as having this disorder (Hines et al.).

### **Procedures**

The researcher implemented a causal-comparative design for this study. The researcher embraced adult learners who were currently enrolled in a general online introductory education course at a university located in the southeastern portion of the United States. The researcher first submitted the correct documentation for IRB approval from the researcher’s university while providing supporting forms from the Dean of Education. The next step was to contact professors who taught the course to gain consent to conduct the study within their classrooms.

After permission was granted, the professors issued a letter written by the researcher seeking volunteers for the study. Each participant was asked to take a short 18 item Adult ADHD Self-Report Survey (ASRS) to adequately ascertain which students were highly likely to suffer from adult ADHD as research has proven that the ADHD population is often underidentified and undiagnosed. The survey took less than 10 minutes to complete. By answering questions on a scale from 0-4, students were able to relay their tendency to possess certain characteristics that are often associated with adult ADHD. If a student had four or more checks within the shaded region of the Adult ADHD Self-Report Scale, he or she is highly likely to have adult ADHD. The researcher utilized this group as the independent variable in the study (Kessler, et al., 2005).

Once the researcher determined which students belonged in the two groups, highly likely to have adult ADHD and those that are not, the researcher examined the benchmark assessment scores, previous course completion rate, and GPA for students in these areas. The learning outcomes/performances of each group were analyzed for differences.

### **Data Analysis**

Data analysis began with descriptive statistics in order to establish demographics and variables for benchmark assessment scores, GPA, and course completion rates. The descriptive statistical analysis is included in Chapter Four. Research questions one and two were tested using a two-tailed independent samples t-test. According to Agresti (2013), the t-test can be utilized to determine differences between the means of two groups. Furthermore, Chi Square test was embraced to examine the last research question. To reiterate, it has been previously

established that the causal-comparative design is an effective tool to utilize when seeking to examine the status of a featured population based on certain variables (Gall et al., 2007).

### **Dependent Variables**

The dependent variable for research question one was benchmark assessment scores which was measured on a continuous scale. Respondents were asked for their final exam essay score from a provided range. Data was coded to represent each range as follows: 1 (100-150); 2 (90-99); 3 (80-89); 4 (70-79); 5 (69 and below); 6 (Not Applicable).

The dependent variable for research question two was GPA, and this too was measurable on a continuous scale. Respondents were asked for their GPA score from a provided range. Data was coded to represent each range as follows: 1 (3.5 and up); 2 (3.4-3.0); 3 (2.9-2.5); 4 (2.4-2.0); 5 (1.9 and below).

The dependent variable for research question three was course completion rate which was a dichotomous variable measured on a categorical scale. Respondents were asked if they completed the course. Data was coded to represent each response as follows: 1 (yes); 2 (no); 3 (not applicable).

### **Independent Variable**

The independent variable, ADHD status, was measurable on a categorical scale. Respondents were required to indicate the frequency of occurrence of symptoms (0 = never; 1 = rarely; 2 = sometimes; 3 = often; 5 = very often). Based on this, if the respondent has 4 or more responses of sometimes, often, and/or very, the individual is considered to have ADHD. All surveys were scored by hand on three separate occasions to ensure the accuracy of findings.

Following this, an ADHD ( 0- No ADHD; 1- Yes ADHD) status variable was created in SPSS 22 and each participant's score was manually entered.

### **Analysis**

Data analysis was comprised of three phases. First was the data preparation phase, which included a review of the data for missing values and data errors, data recoding, and new variable creation. Frequencies and descriptive statistics were performed on categorical and continuous variables, respectively to test for missing values and data errors. The second phase was the preliminary analysis phase, which included the testing of statistical assumptions and Chronbach's alpha reliability. Test of assumptions include normality and homogeneity of variance. Finally, during the primary analysis phase, statistical tests, including the T-Test and Chi Square Tests, were performed to test the null hypotheses.

## CHAPTER FOUR: FINDINGS

### Introduction

The purpose of this study was to test the component of the behavioral learning theory (Singh-Manoux et al., 2005) that relates one's behavior (variable of interest) to his/her knowledge acquisition (dependent variable) in an online, general educational class at a university located in the southeastern portion of the U.S. There are three research questions this study seeks to explore. The three research questions and their associated null hypotheses are as follows:

**RQ1:** Is there a difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

**H<sub>0</sub>1:** There is no statistically significant difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**RQ2:** Is there a difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

**H<sub>0</sub>2:** There is no statistically significant difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part

A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**RQ3:** Is there a difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

**H<sub>0</sub>3:** There is no statistically significant difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom.

The purpose of this chapter is to report the results of the statistical analyses for this study. First, a description of the sample using descriptive statistics will be provided in the demographics section. Next, the data analysis process and results will be reported. There are three phases of the data analysis process. First is the data preparation phase, which includes a review of the data for missing values and data errors, data recoding, and new variable creation. The second phase is the preliminary analysis phase, which includes the testing of statistical assumptions and reliability. Finally, the primary analysis phase is where the statistical tests are performed to test the null hypotheses. Chapter 4 will conclude with a summary of the chapter.

### **Descriptive Statistics**

There were 41 participants included in the final analysis, of which 37 were female and 4 were male. Participants ranged in age from 18-25 (26.2%); 26-35 (28.6%); 36-45 (26.2%); 46-55 (16.7%); 56 and up (2.4%). The ethnic demographics were 69% White or Caucasian, 16.7%

Black or African American, 11.9% Hispanic or Latino, and 2.4% Unidentified. Current Grade Point Average (GPA) reported as 3.5 and up (45.2%), 3.4-3.0 (26.2%), 2.9-2.5 (11.9%), 1.9 or below (2.4%). Last semester, 78.6% of participants were enrolled. Participant course completion was 78.6% and Final Exam Essay (Benchmark Assignment) completion was 83.3%. Benchmark Assignment scores ranged as 100-150 (50%), 90-99 (19%), 80-89 (7.1%), 70-79 (4.8%) and not applicable (19%). See Table 1.

*Table 1*

*Frequencies: Demographics (N = 41)*

	Participants	
	N	%
<b>Gender</b>		
Male	4	11.9%
Female	37	88.1%
<b>Age Range</b>		
18-25	10	26.2%
26-35	12	28.6%
36-45	11	26.2%
46-55	7	16.7%
<b>Ethnicity</b>		
White/Caucasian	29	69%
Black/African American	7	16.7%
Hispanic/Latino	4	11.9%
Unidentified	1	2.4%
<b>GPA</b>		
3.5 and up	19	45.2%
3.4-3.0	10	26.2%
2.9-2.5	5	11.9%
2.4-2.0	5	11.9%
1.9 or below	1	2.4%
<b>Benchmark Assessment Grades</b>		
100-150	20	50%
90-99	8	19%
80-89	3	7.1
70-79	2	4.8%
69 and below	0	0%
N/A	8	19%
<b>Course Completion</b>		



Yes	32	78.6%
No	4	19.5%
N/A	5	11.9%

The cumulative benchmark assessment scores, GPA, and course completion rates for those with and without ADHD were presented in the form of means and standard deviations. Results are shown in Table 2. The mean benchmark assessment scores for those with ADHD was 2.81 and those without ADHD was 2.04. The mean GPA scores for those with ADHD was 1.69 and those without ADHD was 2.16. The mean course completion scores for those with ADHD was 1.07 and those without ADHD was 1.13.

*Table 2*

*Means and Standard Deviations for GPA, Final Exam Scores, and Course Completion (N = 41)*

	ADHD_status	N	M	SD
GPA	No ADHD	25	2.16	1.18
	Yes ADHD	16	1.69	1.08
Final Exam Essay (Cumulative Benchmark Assessment) scores	No ADHD	25	2.04	1.54
	Yes ADHD	16	2.81	2.26
Did you complete all of your courses?	No ADHD	23	1.13	.34
	Yes ADHD	14	1.07	.27

## Data Analysis

### Data Preparation

Once the data was imported into SPSS, frequencies were computed for each variable. There were a total of 43 respondents entered into SPSS. Results indicated that there were no errors in the data. However, there were two respondents who had missing data. One respondent had missing data points associated with the Adult ADHD Self-Report Scale (ASRS), and another respondent did not report their grade point average. These missing values were critical to the

analyses and it was decided that these two respondents would be removed from the data, leaving 41 respondents.

After the two cases were removed, likely ADHD was computed in three steps. First, for each of the 6 questions in Part A, respondents who scored in the darkly shaded boxes were given a score of 1. Second, a new variable was created for each respondent called ADHD\_sum based on the total number of 1's that were summed across all 6 questions. Next, any respondent who had an ADHD\_sum score of 4 or higher was coded as 1 for ADHD\_status, the third variable that was created. All those with less than 4 were coded as 0 for ADHD\_status. ADHD\_status became the independent variable in the three research questions.

### **Preliminary Analysis**

To assess the reliability of the ASRS, Cronbach's Alpha reliability analysis was performed. Cronbach's Alpha measures internal consistency by reviewing the number of survey items and the average inter-correlation among the items (Nunnally, 1994). An alpha coefficient should be above .7 to be considered a reliable scale (Fields, 2013; Pallant, 2012). Results of the reliability analysis for the 6 questions of the ASRS indicated that the measure was reliable as the generated Cronbach's Alpha coefficient was .793.

The independent samples t-test has two main assumptions, normality and homogeneity of variances (Field, 2012; Pallant, 2013; Tabachnick & Fidell, 2012). The assumption of normality assumes that the groups of the independent variable are relatively normally distributed on the scores of the dependent variable (Field, 2012; Pallant, 2013; Tabachnick & Fidell, 2012). Additionally, the independent samples t-test assumes that the variability in scores of the dependent variable are relatively equal between the two groups of the independent variable. If

the variances are unequal or the data is non-normal, this can adversely affect the Type I error rate (Field, 2012; Tabachnick & Fidell, 2012). To test the assumption of normality, the Shapiro-Wilk test is used. It evaluates whether the distribution differs significantly from the normal distribution (Field, 2012; Tabachnick & Fidell, 2012). If the p value is greater than .05, then the data is said to be normally distributed. Levene's test of homogeneity of variance is the standard assessment of equality of variances (Field, 2012; Tabachnick & Fidell, 2012). It produces an F statistic and a p value to evaluate if there are significant differences in the group variances on dependent variable scores. If the p value is less than .05, the variances between the groups are not equal. If the variances are not equal, it is appropriate to correct for this violation by not using the pooled estimate for the error term for the t-statistic, and also making adjustments to the degrees of freedom using the Welch-Satterthwaite method, of which both adjustments are automatically made by SPSS (Field, 2012; Pallant, 2013; Tabachnick & Fidell, 2012).

Results of the Shapiro-Wilk test indicated that for the dependent variable GPA, both the no ADHD group,  $SW(25) = .810, p < .001$  and the yes ADHD group,  $SW(16) = .646, p < .001$  were non-normal. This means that the distributions were significantly different from the normal distribution. Additionally, for the independent variable final exam essay score, the data was also non-normal for the no ADHD group,  $SW(25) = .717, p < .001$ , and the yes ADHD group,  $SW(16) = .695, p < .001$ . See Table 3.

Table 3

*Shapiro-Wilk Test of Normality*

	ADHD_status	Statistic	df	p
What is your current Grade Point Average (G.P.A.)?	No ADHD	.810	25	<.001
	Yes ADHD	.646	16	<.001
	No ADHD	.717	25	<.001

What was your Final Exam Essay (Benchmark Assignment) score for this course?	Yes ADHD	.695	16	<.001
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Levene's test of homogeneity of variance revealed that for GPA, the variances were not equal,  $F(1, 39) = .086, p = .770$ , while for the final exam survey scores the group variances were equal,  $F(1, 39) = 1.17, p = .011$ . See Table 4.

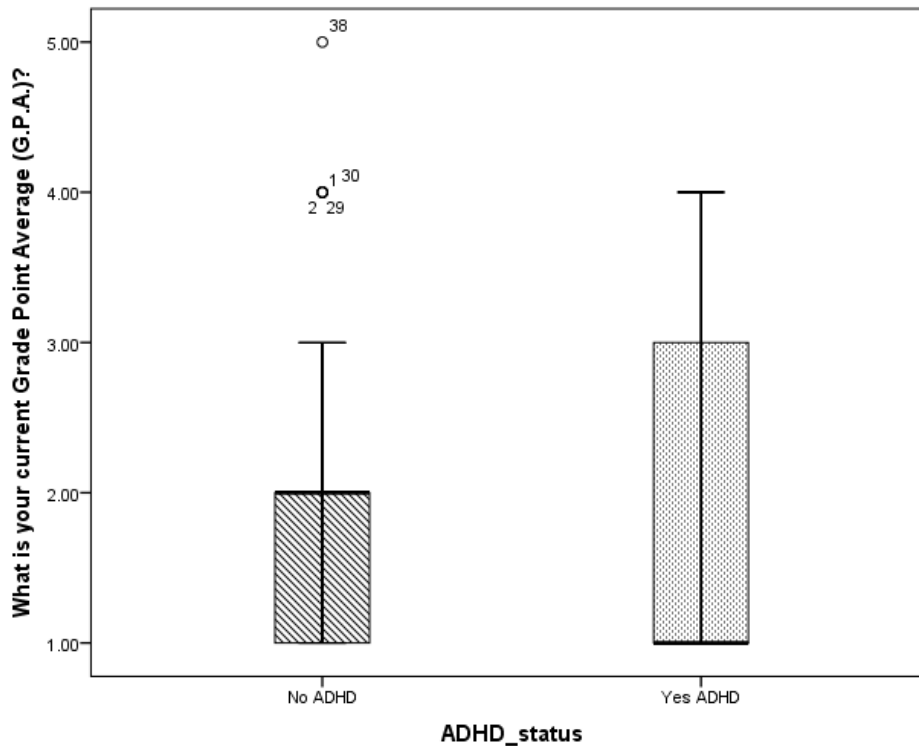
Table 4

*Levene's Test of Homogeneity of Variance*

	Levene's Statistics	df1	df2	p
What is your current Grade Point Average (G.P.A.)?	.086	1	39	.770
What was your Final Exam Essay (Benchmark Assignment) score for this course?	1.167	1	39	.011

Given that the sample sizes in each group were at least 15, and the t-test is a robust test, violations in either the assumption of normality or homogeneity of variance will still allow for the use of the independent samples t-test for two reasons. First, the central limit theorem states that we can assume that the distribution of the sample means is normal if the sample size is 30 or greater (or at least 15 in each group) (Field, 2013; Green & Salkind, 2013; Tabachnick & Fidell, 2012). Second, a statistical test is considered robust if a p value remains between  $\pm .02$  of the original p value after an extreme simulated distortion of the sample is generated to produce violations in normality and/or homogeneity of variance (Boneau, 1960; Tabachnick & Fidell, 2012). Through Monte Carlo sample simulation tests, both Posten (1984) and Schmider et. al., (2010) have shown that the t-test and ANOVA are robust under very extreme normality (i.e. skewness =2 and kurtosis =9) and homogeneity violations, where the difference in variance was

up to 3.5 times in size. Figure 2 illustrates that the variance of the yes ADHD group is not 3.5 times the size of the no ADHD group. Additionally, Table 5 reveals that the skewness and kurtosis values are within the acceptable range to produce accurate p values. So, the t-test will be used in this analysis.



*Figure 1:* Box and Whisker Plot of GPA by No and Yes ADHD Groups revealed no significant differences in variances.

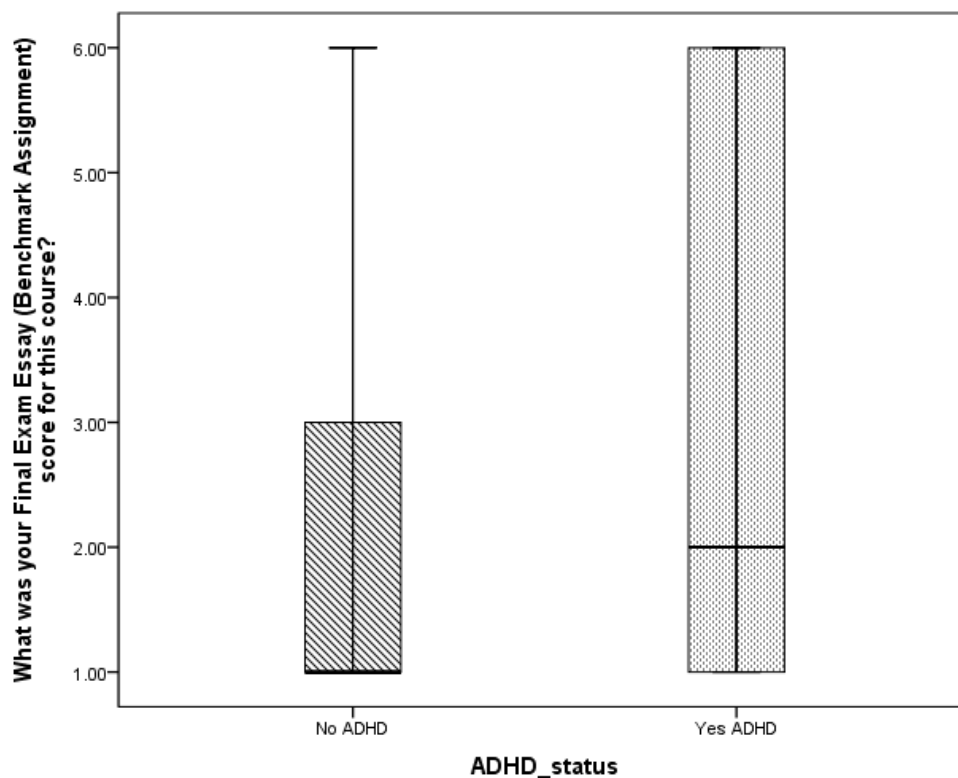


Figure 2: Box and Whisker Plot of *Final Exam Essay Scores* by No and Yes ADHD Groups revealed significant differences in variances as the interquartile range (shaded area) which contains 50% of the cases was much shorter than that of the Yes ADHD group. However, the differences are not 3.5 times in size.

Table 5

*Skewness and Kurtosis Values for No and Yes ADHD Groups for GPA and Final Exam Essay Scores*

	ADHD_status	Skewness	Kurtosis
What is your current Grade Point Average (G.P.A.)?	No ADHD	.992	.073
	Yes ADHD	1.084	-.544
What was your Final Exam Essay (Benchmark Assignment) score for this course?	No ADHD	1.563	1.719
	Yes ADHD	1.221	-.031

## Primary Analyses

### Null Hypothesis One

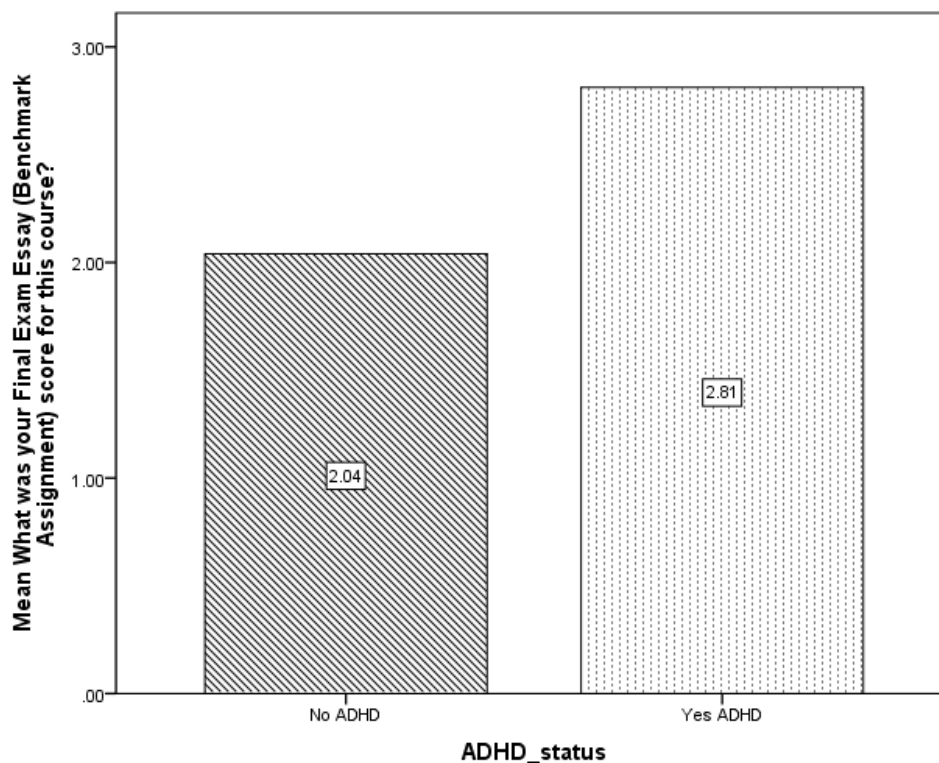
A two-tailed independent samples t-test was used to analyze the first null hypothesis which stated that there would be no significant difference in benchmark assessment scores between those with ADHD and those without ADHD. The dependent variable, benchmark assessment grades was measured using an interval scale where each number represented a range score that an individual would receive based on the final essay assessment. Higher scores represent higher benchmark assessment grades. ADHD status was a nominal variable where 0 represented not having ADHD and 1 represented having ADHD.

Results of the independent samples t-test indicated that there was no statistically significant difference in final essay assessment scores between the no ADHD group ( $M = 2.04$ ,  $SD = 1.54$ ) and the yes ADHD group ( $M = 2.81$ ,  $SD = 2.26$ ),  $t(34.22) = -1.20$ ,  $p = .196$ . See Table 6. Cohen's  $d$  effect size measure was .38, indicating that the magnitude of the differences between the mean scores was small, based on Cohen's (1988)  $d$  effect size standards of .2 for small, .5 for medium, and .8 for large. See Figure 3. As a result of the independent samples t-test, the researcher fails to reject the null hypothesis.

Table 6

#### *Independent Samples T-test (n = 41)*

	No ADHD		Yes ADHD		<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Final Essay Assessment	2.04	1.54	2.81	2.26	34.22	-1.20	.196	.38



*Figure 3:* Bar chart of final exam assessment mean scores by no and yes ADHD groups

In a post-hoc power analysis using Cohen's *d* effect size value, a .05 error rate and the sample size revealed a power value of .247. This means that there was only a 24.7% chance of detecting a significant effect in this analysis if one actually existed in the real world. The standard for social scientific research is .80 (Field, 2013; Tabachnick & Fidell, 2012). When sample size calculations are performed prior to data collection, it is standard practice to assume a medium sized effect in the power analysis calculation. Future research should consider using a small effect size in the sample size calculations for this type of study.

### **Null Hypothesis Two**

A two-tailed independent samples *t*-test was used to analyze the second null hypothesis which stated that there would be no significant difference in GPA between those with ADHD



and those without ADHD. The dependent variable, GPA was measured using an interval scale where each number represented a range score that an individual would receive for GPA. Higher scores equal higher GPA. ADHD status was a nominal variable where 0 represented not having ADHD and 1 represented having ADHD.

The results indicated that there was no statistically significant difference in GPA between those without ADHD ( $M = 2.16, SD=1.18$ ) and those with ADHD ( $M = 1.69, SD = 1.08$ ),  $t(26.96) = 1.29, p = .204$ . Cohen's  $d$  effect size results of .41 indicated that the magnitude of the differences between the mean scores was small, based on Cohen's (1988) standards. See Table 7 and Figure 4. Based on the results of the independent samples t-test, the researcher fails to reject the null hypothesis.

Table 7

*Independent Samples T-test (n = 41)*

	No ADHD		Yes ADHD		<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
GPA	2.16	1.18	1.69	1.08	39	1.29	.204	.41

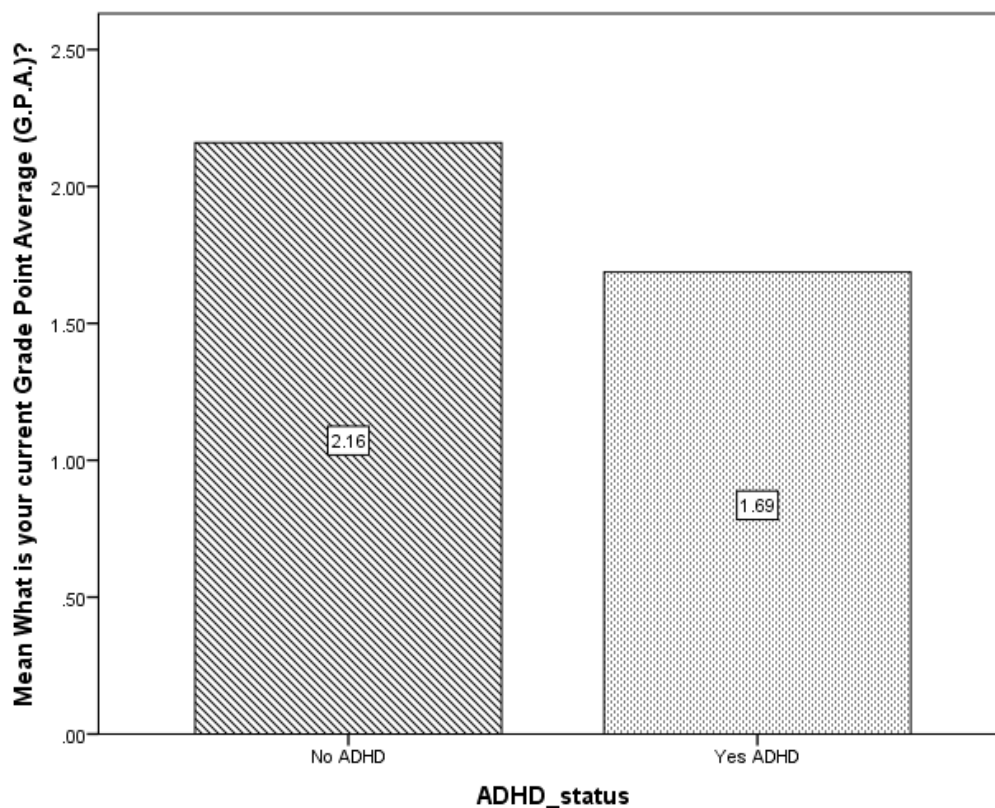


Figure 4: Bar chart of GPA mean scores by no and yes ADHD groups

In a post-hoc power analysis using Cohen's  $d$  effect size value, a .05 error rate and the sample size revealed a power value of .243. This means that there was only a 24.3% chance of detecting a significant effect in this analysis if one actually existed in the real world. The standard for social scientific research is .80 (Field, 2013; Tabachnick & Fidell, 2012). When sample size calculations are performed prior to data collection, it is standard practice to assume a medium sized effect in the power analysis calculation.

### Null Hypothesis Three

The third null hypothesis stated that there would be no significant difference in course completion rates for those with ADHD and those without ADHD. The dependent variable for research question three was course completion rate, which was a dichotomous variable measured

on a categorical scale. Respondents were asked if they completed the course. Data was coded to represent each response as 1 for yes and 2 for no.

### **Chi-Square Test of Independence Assumptions**

In order to run a Chi-Square Test of Independence, a few assumptions should be met. First, the two variables in the analysis must be dichotomous. Secondly, each cell in the 2 x 2 table should have an expected frequency of 10 (Howell, 2010; Warner, 2012). If the expected frequencies in each cell are below 10, then Fisher's Exact Probability Test should be considered, which is provided as output from the Chi-Square Test of Independence (Howell, 2010; Pallant, 2013; Warner, 2012). Since the independent variable, ADHD status was coded as yes (1) or no (0), and the dependent variable, course completion was coded as yes (1), no (2), and not applicable (3), the variables are considered dichotomous. The total sample size consisted of 41 participants which adequately met the sample size assumption for a Chi-Square analysis.

### **Chi-Square Test of Independence**

The Chi-Square Test of Independence with Yates Continuity Correction used with 2 x 2 tables was conducted to determine if an association existed between course completion score for those with ADHD and those without ADHD. Table 8 contains the frequencies and Chi-Square statistics. Figure 5 contains the bar chart of the frequencies. There was no statistically significant association between course completion and ADHD status  $\chi^2(1) = .000, p = .988$ . The Phi Coefficient is the effect size statistics most commonly used with 2 x 2 tables (Field, 2012; Pallant, 2013). It is a correlation coefficient that ranges from 0 to 1 with higher values indicating a stronger association between two variables. The Phi Coefficient for this analysis was .092, indicating a small effect based on Cohen's standards of .10 for small effect, .30 for medium

effect, and .50 for a large effect. As a result of the Chi-Square Test of Independence, the researcher failed to reject the null hypothesis.

Table 8

Course Completion Frequencies by no and yes ADHD groups ( $n = 37$ )

Completed Course	No ADHD		Yes ADHD		$\chi^2(1)$	$p$	$phi$
	$n$	%	$n$	%			
Yes	20	87.0%	13	92.9%	.000	.988	.092
No	3	13.0%	1	7.1%			

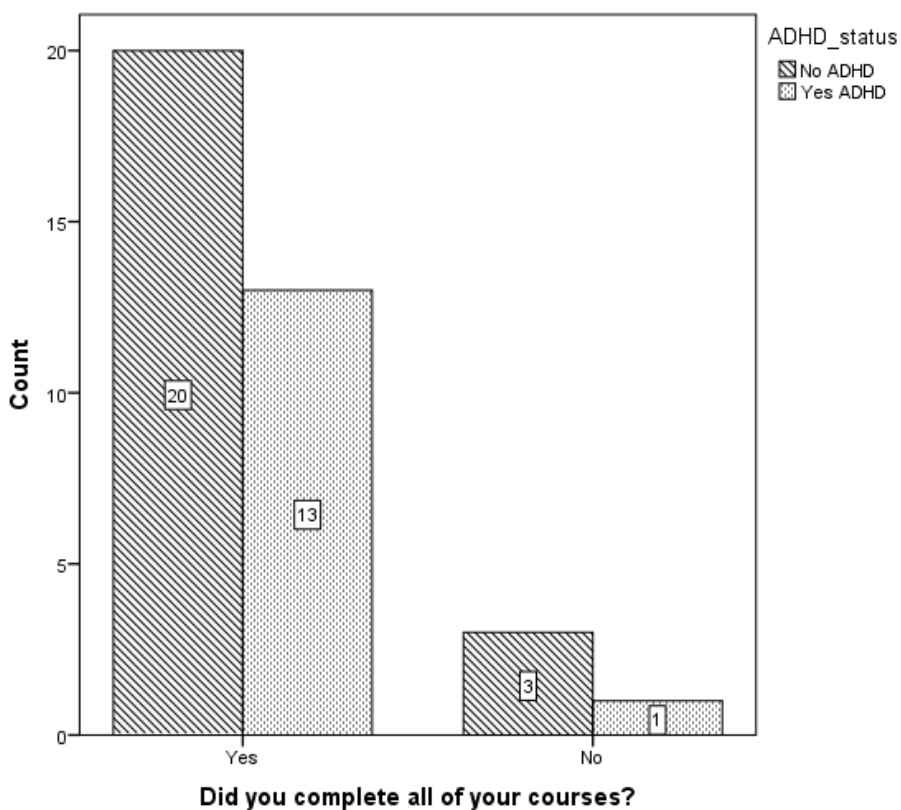


Figure 5: Bar chart of course completion frequencies by no and yes ADHD groups

### **Results Summary**

Three hypotheses were examined to compare students who were highly likely to have ADHD and those who were not. The first hypothesis measured benchmark assessment scores. The results of the independent samples t-test indicated that there was no significant difference in yes and no ADHD groups. The second hypothesis evaluated differences in GPA scores between the yes ADHD group and no ADHD group. The results indicated that there was no significant difference between groups. Finally, the third hypothesis examined if there was a significant association between ADHD group and course completion rates. The results showed that there were no significant statistical differences in course completion rates between students who have and do not have ADHD. Chapter five will include a discussion of results, implications, and the future research recommendations in this area.

## **CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

### **Discussion**

The purpose of this causal-comparative study was to examine the impact, if any, that adult ADHD has within the online environment. This research sought to determine if students who are highly likely to have adult ADHD suffer from any challenges within the online classroom as many adverse side effects associated with ADHD can hinder successful completion of online courses (Advokat et al., 2011; Knouse & Safren, 2010; Quinn & Madhoo, 2014; Vickers, 2010; Weyandt et al., 2013). The researcher conducted an extensive literature review of adult ADHD and online education, and sought to see if there was existing research which marries the two. After exhaustive research measures were embraced, the researcher set forth to close the gap in the literature by conducting a new study which involved students enrolled in a general online education course. Independent samples t-tests and Chi-Square tests were utilized in the new study. By carefully examining benchmark assessment scores, GPA, and course completion rates, the researcher hoped to discover major discrepancies, if any, which might be present while formulating ideas for adequately addressing each challenge. This chapter will review the findings while carefully discussing the results. Furthermore, limitations and implications for practice will be integrated while recommendations for future research will be surmised.

### **Conclusions**

#### **Research Question One**

In order to fill in the gap in the literature pertaining to the impact of adult ADHD within the online classroom, this study was developed to answer three research questions. The first

question centered upon benchmark assessments. “Is there a difference in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?” To address this question, an independent samplest-test was utilized.

The null hypothesis in relation to Research Question 1 states there are no significant differences in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Results from the data did not indicate significant differences in benchmark assessment grades (final exam essay) for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Therefore, the researcher failed to reject the null hypothesis.

As stated in Chapter 4, results of the independent samples t-test indicated that there was no statistically significant difference in final essay assessment scores between the no ADHD group ( $M = 2.04$ ,  $SD = 1.54$ ) and the yes ADHD group ( $M = 2.81$ ,  $SD = 2.26$ ),  $t(34.22) = -1.20$ ,  $p = .196$ . Cohen’s  $d$  effect size measure was .38, indicating that the magnitude of the differences between the mean scores was small, based on Cohen’s (1988)  $d$  effect size standards of .2 for small, .5 for medium, and .8 for large.

Although no statistically significant differences were found, much can still be hypothesized in relation to the slightly higher mean scores for the ADHD group (those who are highly likely to have ADHD). Surprisingly, the findings here do not support research implemented by DuPaul et al. (2009), Advokat (2011), and Weyandt et al. (2013) which purported that students who have ADHD possess the propensity for poorer academic outcomes and increased issues in relation to drop-out rates. These researchers along with Barkley (2012), Heiligenstein and colleagues (1999), and Gray et al. (2014) argue that students who have adult ADHD tend to have poor coping skills and time management deficiencies. Based on the data from this study, students who are likely to have adult ADHD have slightly higher mean benchmark scores when compared with their neurotypical counterparts. One theory for this difference could be explained by sheer determination to complete their degree in order to possess gainful employment upon graduation (Baum & Ma, 2007; Kuriyan et al., 2012). If students who are likely to suffer from ADHD struggled during the beginning of the semester and throughout the duration, they would presumably strive to do better on the final assignment (grade) for this course. Although research provided by Friedman and Zametkin (2010) along with studies conducted by Sing-Manoux et al. (2005), Quinn and Madhoo (2014), and Weyandt and colleagues (2013) establish an effective foundation for the behavioral learning theory, this study did not fully apply such because more areas of additional exploration have emerged in relation to differences between those who are highly likely to suffer from adult ADHD when compared with their neurotypical counterparts. Consequently, this study did not succinctly ascertain if one's behaviors within the online classroom actually causes differences due to ADHD complications. Exploration of additional dimensions within this area are warranted for future research efforts.



Although a positive discovery was uncovered as there were slightly higher mean scores by the ADHD group in the area of benchmark assessment, it would be beneficial to further explore if their specific behaviors impacted their ability to acquire new information. It is probable that students who are likely to suffer from ADHD successfully utilized resources provided by the university library in order to gain the much-needed help with their final research paper (benchmark assessment assignment). The fact that this group very possibly sought help to improve their final averages supports information provided by Haynie (2014) and Weyandt et al. (2013) which express the need for students with ADHD to embrace necessary supports in order to realize successful outcomes within the virtual environment. Research by Swartz et al. (2005) and Haynie (2014) substantiate the need for students with ADHD to seek resources to overcome the complexities associated with the online classroom. The researcher is optimistic to observe that the ADHD group apparently has done such.

### **Research Question Two**

The second research question was is there a difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

The null hypothesis in relation to Research Question 2 states there is no significant difference in GPA for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Results from the data did not indicate statistically significant differences in GPA for students who are highly

likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Therefore, the researcher fails to reject the null hypothesis.

As provided in Chapter 4, the results indicated that there was no statistically significant difference in GPA between those without ADHD ( $M = 2.16, SD = 1.18$ ) and those with ADHD ( $M = 1.69, SD = 1.08$ ),  $t(26.96) = 1.29, p = .204$ . Cohen's  $d$  effect size results of .41 indicated that the magnitude of the differences between the mean scores was small, based on Cohen's (1988) standards.

Due to the mean scores, the researcher has formulated additional hypotheses for the findings in relation to the slight differences in mean GPA scores. Haynie (2014) and Sibley et al. (2012) suggested that adults who suffer from ADHD are often unaware of their issues, and they can inadvertently suffer negative consequences from the online environment. The ADHD group could have lower GPA scores because they have not embraced helpful resources which could assist in overcoming barriers that exist within the online classroom such as time management, inattention, and organization (Friedman & Zametkin, 2010; Lewandowski et al., 2012). Quite possibly many students who completed the survey and are highly likely to suffer from ADHD are not cognizant of their issues (Quinn & Madhoo, 2014; Sibley et al., 2012). They could possibly live under the assumption that alternative problems exist such as depression and anxiety, and they could possibly ignore the real issues related to ADHD (Lewandowski et al., 2012; NIMH, 1996). Research from the NRC reinforces the need for a multimodal approach for individuals who have learning disabilities, as many conditions are comorbid and need specialized assistance. If students who are highly likely to suffer from adult ADHD can receive an early

diagnosis, then efforts can be exhausted to identify various areas which would impact one's GPA including attention, self-motivation, drive, and organization (Knouse & Safren, 2010; Weyandt et al., 2013).

### **Research Question Three**

Finally, the third research question was is there a difference in course completion rate for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom?

The null hypothesis in relation to Research Question 3 states there is no significant difference in course completion rates for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Results from the data did not indicate significant differences in course completion rates for students who are highly likely to have adult ADHD, (as indicated by four or more checks within the shaded region of Part A on the Adult ADHD Self-Report Scale), and those who are not highly likely to have adult ADHD within the online classroom. Once more, the researcher fails to reject the null hypothesis.

As previously stated in Chapter 4, the Chi-Square Test of Independence with Yates Continuity Correction used with 2 x 2 tables was conducted to determine if an association existed between course completion score for those with ADHD and those without ADHD. There was no statistically significant association between course completion and ADHD status  $\chi^2 (1) = .000, p = .988$ . The Phi Coefficient is the effect size statistics most commonly used with 2 x 2

tables (Field, 2012; Pallant, 2013). It is a correlation coefficient that ranges from 0 to 1 with higher values indicating a stronger association between two variables. The Phi Coefficient for this analysis was .092, indicating a small effect based on Cohen's standards of .10 for small effect, .30 for medium effect, and .50 for a large effect.

Keeping the aforementioned results in mind, the researcher has further explored reasons for the minimal differences in course completion rates for the two groups. Similar to research conducted by Shea and Bidjerano (2014), this researcher infers that similar course completion rates support the fact that students who have adult ADHD can achieve successful outcomes if certain issues are addressed. It is quite likely that students who suffer from ADHD have faced prior obstacles within the online environment and they have begun to take a proactive stance to gain better completion results (Kupczynski et al., 2011; Taniguchi & Kaufman, 2005). Just as Meaux et al. (2009) and Shea and Bidjerano (2014) discovered that certain behaviors can impact class performance and academic outcomes, it is imperative for students with adult ADHD to seek help when necessary and to embrace ongoing support. The data from this study sheds light on the reality that many of the students within the ADHD group have gained positive coping mechanisms to assist with their classroom efforts by properly meeting course requirements in order to complete their work (Farrell, 2003; Faigel, 1995; Denbo, 2003; Heiligenstein et al., 1999; Krank et al., 2013).

### **Conclusions**

The current study sought to close the gap in the research concerning adult ADHD and the online classroom. Based on the findings from this study, much optimism can be extended for adults who are enrolled in online courses which are highly likely to suffer from ADHD. No

major statistical differences were realized in relation to benchmark assessment scores, GPA, and course completion rates. Prior research along with the featured study demonstrates that these students can perform successfully within the online environment (Bartlett et al., 2010; Lewandowski et al., 2012; Shea & Bidjerano, 2014). Although Friedman and Zametkin (2010) along with Weyandt et al. (2013) argue that low motivation and inattention can impact students with ADHD, again no major differences were realized in course performance between the two groups. Furthermore, work performed by DuPaul et al. (2009) and Krank et al. (2013) which purports increased drop-out prevalency rates were dispelled by this study as well. Specifically, students in the ADHD group did not have significantly different course completion rates than their counterparts. These findings denounce the prior work in this area by showing that these students can successfully embrace positive coping mechanisms in order to successfully manage their time and attention wisely (DuPaul et al., 2009; Krank et al., 2013).

Work conducted by Shea and Bidjerano (2014) is in alignment with the results from this study. For example, these researchers posited that students can achieve success within the online environment if certain proactive measures are embraced. Similar GPA rankings for both groups support their findings. If continued measures are embraced to provide effective learning environments and course materials for all students, those who suffer from ADHD can still enjoy comparable success as proven by this study (Eskey & Schulte, 2010; Allen & Seaman, 2013; Amro et al., 2015).

As with many studies, the more one looks for answers, the more questions arise. The research in this area still holds much potential as numerous avenues are left that warrant additional exploration. It is imperative to continue to evaluate the impact that adult ADHD can

have within this environment as online learning will continue to grow in the future (Haynie, 2014). Numerous questions still remain in this area, and more efforts must be embraced to produce successful learning domains for all learners, especially those who suffer from adult ADHD (Driscoll et al., 2012). By marrying the established research from the literature with the appropriate adjustments to the featured study, more discoveries could be uncovered to further assist these efforts. All educators should be committed to helping learners reach their highest level of potential. Future results including larger sample sizes might reveal significant statistical differences which are vastly important and therefore, worthy of additional exploration. All students matter, and it is imperative that continued efforts are made within this area to advance the knowledge for students with adult ADHD. By properly identifying students who are highly likely to suffer from adult ADHD, more concerted measures can be embraced to help these students (Garnier-Dykstra et al., 2010; Advokat et al., 2011).

### **Implications**

The findings from this study yield several implications for practice. It has been established that more research is needed within the area of adult ADHD. Therefore, more public awareness campaigns could be embraced so that proper identification measures can be realized. ADHD often goes undiagnosed, (Sibley et al., 2012) and if one doesn't know that a problem exists, it is quite difficult to secure the necessary resources which could provide relief. In particular, future collaborative efforts could be embraced across multiple disciplines to increase awareness efforts for this issue. Specifically, practitioners from the behavioral health fields could partner with educators to implement best practices for students to use within their educational, professional, and personal lives. More professional development opportunities

could be provided for educators to help professors identify potential challenges which could be proactively avoided if certain measures are embraced. By exposing educators to the research on adult ADHD, several adjustments could be made to help students overcome challenges such as inattention, organization, and time management (Bell et al., 2011; Norwalk et al., 2008).

Furthermore, self-advocacy directives could be extended to assist adults who suffer from ADHD in order to gain the necessary resources and support to help them live productive lives. Quite frankly, the virtual classroom could quite possibly serve as an intervention strategy for students who suffer from adult ADHD. If an adult learner who is suffering from ADHD is experiencing difficulties in the typical brick and mortar classroom due to various distractors, it could prove beneficial to implement the online environment as an alternative. Results from this study reflected comparable learning outcomes for both the ADHD group and non-ADHD group, and therefore the unique characteristics associated with an online environment could actually serve as positive aspects for students who are easily distracted and suffer with organization and time management (Bell et al., 2011; Norwalk et al., 2008). By teaching this demographic certain skills, they can begin to give voice to issues that are often overlooked or misunderstood by others in society. In short, numerous stakeholders should come to the table to formulate effective problem-solving strategies that will benefit these individuals. By making small steps, one can begin to change the tides for adults who suffer from ADHD one student at a time.

### **Limitations**

Although multiple efforts were embraced to minimize limitations for this study, a few have emerged which are worthy of closer examination. Survey research presents many challenges. Obstacles still exist even under the best conditions (Kennedy & Vargus, 2001).

According to Nulty (2008), response rates are usually lower than one might fathom for online surveys. Nulty purports that a typical online survey has a response rating from 20-33%. As it happens, response rates for this study faced insurmountable challenges which could have directly influenced the outcomes. Recruitment efforts for this study were difficult at best. Participants for this study included students who had completed the online version of EDUC 200. During three different rounds, the researcher contacted professors of this course requesting that they send recruitment letters along with the survey link to their students who had just completed the course the week prior. During round one, eight professors were contacted, and the researcher received email confirmations back from only four professors. A follow-up email was sent one week after the initial contact with each course instructor. This additional effort did not elicit any new professor responses. The same procedures were followed for round two, which included 10 professors. After the initial contact and follow-up emails were sent, five professor responses resulted. Finally, during the third round of contact, five professors were emailed, and two professor email responses were received which confirmed dissemination to students.

Round one had a potential to reach 262 students. However, this number was significantly reduced as only half of the professors (4) responded to the researcher's request. During round two, more than 350 students were potentially available for participation, but once again, only half (5) professors responded to the request for help. Finally, during the last round of requests, approximately 100 potential students were available for participation, but only two out of five professors responded to the researcher's email for help. Therefore, after the end of one full semester which encompassed three rounds of requests, only approximately 350 students were contacted which resulted in 41 completed surveys,  $N=12\%$  response rate. One survey was



excluded from analysis due to missing data. The researcher went to great lengths to gain the largest number of participants as possible.

The survey was completely reliant upon volunteers, both professors and students. Survey research can produce limited results (Nulty, 2008). More buy-in was needed from the professors in order to successfully reach the largest student base possible. It was quite obvious to the researcher that the student pool would be marginal as professor responses were minimal. Professor issues with students could have made a significant impact on student participation. The researcher emailed the EDUC 200 professors during the end of the semester as one of the components involved the benchmark assessment grade (final essay assignment at the end of the course). Although no significant differences were discovered within the areas of benchmark assessment grades, GPA, and course completion rates, the small differences within the mean scores in these areas lead the researcher to believe that a larger sample size could have possibly yielded significant findings. The minimal results could be misleading on the surface.

Several hypotheses have emerged which could explain the low response rate. Quite possibly many professors overlooked or ignored the researcher's email requests as they were busy finalizing semester grades. In the future, a letter from the Dean of the School of Education could possibly help to increase professor buy-in so that educators could fully realize the potential benefits that the outcomes of this study could provide both inside and outside of the classroom. Specifically, the letter could contain detailed information in relation to the current research which purports that ADHD is underdiagnosed in the adult population, particularly in women (Quinn & Madhoo, 2014). Furthermore, the Dean's letter could serve as a catalyst to encourage dissemination of the survey request letter from professors by detailing the benefits of proper

identification measures within the area of ADHD (Bartlett et al., 2010; Vickers, 2010; Xenitidis, 2010). Employees are more likely to follow the orders given by their superior in comparison to a request made by a student (Bell et al., 2011; Vickers, 2010).

Another potential issue for survey participation could lie in the timeframe in which the requests were made. The participating professors sent the researcher's email letter of request after the course ended. Many students could have ignored emails from their professors once the course was finished. Additionally, students who did not do well in the course or who experienced issues with the professor would not be highly likely to take the time to complete a survey which did not have any academic relevance for them. Furthermore, no compensation was provided for the participants, and therefore, many might not value the need to provide their input in the study.

In future studies, it could prove quite beneficial to involve additional courses in survey dissemination, quite possibly a general psychology course could be utilized. By doing such, the sample pool would be increased exponentially (Nulty, 2008). This effort could also yield more diversity in relation to the respondents. Although the researcher had a potential to reach approximately 350 introductory education students, this is quite a homogenous group. It would be more beneficial to proactively seek heterogeneous samples from a course that is required by multiple majors, such as psychology. This would lend itself to greater generalization of any research findings that emerged (Nimon, 2012).

Additional limitations could have related to the survey itself. The ASRS requires that students make self-evaluations in various areas. Quite possibly the students could not have understood all of the items covered on the instrument (Asbjornsen et al., 2010) or they could

have experienced difficulties recalling issues they have experienced which also served as indicators for various ADHD symptoms (Gray et al., 2014). Since the survey was taken without assistance, there was no way to provide further explanations if issues arose.

An additional limitation for the survey worthy of paucity was the ratio of participation between women versus men (37:4). Although ADHD is more prevalent in young boys (two to three times more likely), in adulthood, the prevalence is more comparable (Quinn & Madhoo, 2014). Research conducted by Quinn and Madhoo reveal that women are usually diagnosed with ADHD at later ages, particularly in their 20's and 30's, and by the time a true diagnosis has been received, many women have successfully embraced positive coping techniques to deal with their ADHD symptoms. Essentially, by adulthood, they can better mitigate the adverse side effects experienced from their disorder. These colleagues argue that quite often women go undiagnosed for years because other comorbid issues exist such as depression , anxiety, and obsessive-compulsive disorder (often associated with perfectionism) and these traits often mask other ADHD symptoms because they are internalized behaviors that are not often observed by teachers in the typical American classroom. In fact, many women do not gain a proper diagnosis until their children have been identified with this disorder, and it is usually due to their increased awareness of ADHD when seeking help for their sons. Historically boys have received more referrals for ADHD due to their rambunctious and hyperactive tendencies. Girls, on the other hand, usually present with inattention, low self-esteem, peer-relationship issues, and therefore, their symptoms often go unnoticed for years (Quinn & Madhoo).

Keeping the above research in mind, it is quite understandable why more women chose to respond to the survey request. Men tend to have issues with hyperactivity and organization

(Quinn & Madhoo, 2014), and therefore they would be less likely to read a follow-up email that was sent by a course professor once they class had ended. Even if the email request was read, it is highly unlikely that most men would take the time to follow the survey link and actually answer the questionnaire if no obvious benefit was present for them as men tend to think more logically while women are usually helpers and nurturers by nature (Quinn & Madhoo). In future studies, the researcher could embrace a more proactive stance and send the surveys at the beginning of the semester while also providing individualized survey outcomes so that more personalized buy-in could be realized. These efforts could hopefully yield increased diversity and participation outcomes.

A final limitation for the study is in relation to the point of contact for the participants. Asking for survey participation after a course has ended can be more challenging than one thinks. Quite possibly different variables could be examined in future studies which do not require information from the students at the end of a course. It is much more feasible to garner assistance from professors and students while the course is still live. This critical observation will be duly noted by the researcher for future research efforts.

### **Recommendations for Further Research**

The review of the literature and findings for this study establish the foundation for the forthcoming recommendations. A more effective timeline for survey dissemination is needed in the future to gain greater participation from professors to realize the largest pool of participants possible. It is quite probable that the adults who are likely to have ADHD are underidentified in this study as argued by Sollman et al. (2010) as well as Sibley et al. (2012). Efforts to reach students for participation did not occur until the end of the semester. By the term's last week,

many students who have struggled with inattention, motivation, and academic performance (Bernfort et al., 2007; Secnik et al., 2005) have already dropped the course. It would be beneficial to administer the survey at the beginning of the semester to possibly identify students who are experiencing issues related to ADHD so that appropriate instructional adjustments can be made. Confidentiality would remain a critical component of the process unless a student requests to be notified of their status results. On the other hand, the researcher could assign specific numbers to each participant so that all could receive individualized reports. The work by Xenitidis et al. (2010) and Lewandowski et al. (2012) could be extended with future efforts by showing how comorbid issues are often present for students who are likely to suffer from adult ADHD. By making the first steps to properly identify such individuals, (Garnier-Dykstra et al., 2010) more strides can be embraced to connect these individuals with effective resources which can help improve academic outcomes across disciplines as evidenced by research from Stone et al. (2008) as well as Storm and White (2010).

More professor buy-in would be beneficial for future studies as well. Additional professional development efforts are needed for professors to help this demographic fully realize the impact that adult ADHD can have within the online environment. Educators need tools added to their instructional arsenal to adequately assist all diverse learners. By exposing them to the research on adult ADHD, many instructors can begin to adjust teaching methods in an effort to help students improve study techniques, research processes, and critical thinking skills (Bell et al., 2011; Norwalk et al., 2008). It is imperative to remain mindful that many faculty resist change, especially efforts that center upon students with disabilities (Hsiao & Smith, 2011; Wolanin & Steele, 2004; Vance & Weyandt, 2008). Future efforts should be embraced to help

faculty fully realize the “win-win” outcomes of properly identifying students with adult ADHD so that more proactive measures can be embraced to help improve learning outcomes. When completion rates increase, so does job security. Effective faculty perception is an ongoing area worthy of further examination (Bell et al., 2011; Benham, 1997; Wolanin & Steele, 2004).

Finally, future efforts must center upon helping students overcome barriers associated with ADHD once they have been appropriately identified. Work performed by Hughes (2007), Sibley et al. (2012), and Bartlett et al. (2010) could be extended in the future by using data from this study to assist students who are highly likely to suffer from adult ADHD. By looking at present circumstances and previous childhood experiences, patterns can be identified to uncover behaviors which need modifications in order to improve outcomes not only educationally, but within the students’ personal lives as well. Students can begin to identify sources of struggles, conflicts, and overall barriers to their success which would impact their course performance and ability to complete their degree plans. Efforts can be extended to help these adults learn more about their issues while serving as their own biggest advocates. Adults who suffer from ADHD need to recognize their triggers and proactively seek strategies to help overcome obstacles. Continued research efforts in this area will help improve individualized instructional methods so that adults with ADHD can continue to perform successfully within the online classroom (Barkley, 2012; Bartlett et al., 2010).

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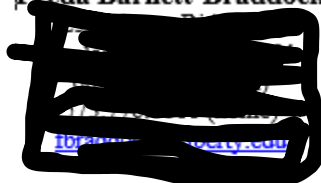
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**APPENDIX A: Consent Letter to School of Education Dean****Freda Barnett-Braddock**Dear 

The proposed study seeks to determine if differences exist for online students who are highly likely to have adult ADHD compared with those who are not highly likely to have ADHD. If the study is approved, each student selected to participate will be asked to voluntarily participate and can freely withdraw at any point in the study. Students will be asked to sign a consent form agreeing to participate while acknowledging that they understand their right to withdraw or their right to refuse participation at any point of the study.

The purpose of this quantitative study will be to examine the impact that adult ADHD has within the online classroom in order to improve retention and comprehension efforts. In order to conduct this study, the Adult ADHD Self-Report Scale Symptom Checklist (ASRS) will be administered. The ASRS is a screening tool which allows adults to self-report symptoms which are congruent with adult ADHD. Succinctly, this "tool was developed in conjunction with the World Health Organization (WHO), and the Workgroup on Adult ADHD that included the following team of psychiatrists and researchers Dr. Lenard Adler, Dr. Ronald C. Kessler, and Dr. Thomas Spencer" (Kessler et al., 2005). An adult is highly likely to suffer from symptoms related to adult ADHD if four or more checks are located within the shaded region of the Adult ADHD Self-Report Scale. (This identification simply suggests that additional testing efforts could prove beneficial for the individual.) Furthermore, analysis will be conducted on benchmark

assessments (course-embedded pretests), GPA, and course completion rates. Data will be compared for students who are highly likely to have adult ADHD (as indicated by four or more checks within the shaded region of the Adult ADHD Self-Report Scale) and those who are not likely to suffer from this disorder.

Initial surveys will be collected at the beginning of the study which examine prior course completion rates along with current Grade Point Averages (G.P.A.) Additionally, benchmark assessment scores (course-embedded pretests) will be analyzed as well. Based on the survey results, the two groups will emerge (those who are highly likely to have adult ADHD and those who are not.)

All names of the participants and data will be maintained in a secure location which is only accessed by the researcher. The data which is collected will only be shared with committee members that are involved in the study along with the individual participants.

This study will be beneficial for the participants as they will be given the opportunity to identify certain characteristics which could adversely impact their educational and personal environments. By identifying students who are highly likely to suffer from adult ADHD, concerted measures can be made to encourage additional testing and resources which will help improve their daily lives. The researcher will be given the opportunity to examine the struggles which are present for online learners who are highly likely to suffer from adult ADHD so that appropriate adjustments can be made within the online classroom to help alleviate some of the issues which are present that hinder success for this demographic.

Please do not hesitate to let me know if you need further clarity on any of the information that has been shared. I look forward to the results which can be realized as a result of



these research efforts. The study will not only help the individual students but the school as well.

Thank you once again for considering this proposal.


Sincerely,  
*Freda Braddock*

## APPENDIX B: Request Letter to Professors and Students

Dear Professor,

My name is Freda Braddock, Ed.D. Candidate at Liberty University. I am writing to request your help. My dissertation research is Adult ADHD: What is the Impact on Student Achievement Within the Online Classroom?

I am recruiting students who were enrolled in your online section of EDUC 200 this summer, May/June/July/August 2015, for participation in this study. I would greatly appreciate if you could assist me by sharing my recruitment information with those students. Please advise them go to <https://www.surveymonkey.com/r/round44444> and complete the survey.

If you have questions or need additional information about the study, please feel free to contact me at fbraddock@liberty.edu or 

Thank you in advance for your consideration of this request.

Sincerely,  
Freda Barnett-Braddock, Ed.S.  
Ed.D. Candidate

### CONSENT FORM

ADULT ADHD: What is the Impact on Student Achievement within the Online Classroom?  
Freda Barnett-Braddock, Principal Investigator, Liberty University, School of Education

You are invited to be in a research study on the impact that adult ADHD has within the online classroom. You were selected as a possible participant because you are presently enrolled, or were enrolled, in an online general education course at Liberty University. I ask that you read this form and ask any questions you may have before agreeing to be in the study. This study is being conducted by Freda Braddock as a partial fulfillment of the requirements for the Doctor of Education degree (Ed.D.).

Background Information: The purpose of this study is to examine the impact (if any) that adult Attention Deficit Hyperactivity Disorder (ADHD) has on student achievement within the online classroom.

Procedures: If you agree to be in this study, I would ask you to do the following things: Please complete Parts I and II of the survey. A link has been provided for you. The entire survey should take less than 10 minutes to complete.

Risks and Benefits of being in the Study: The study has no more risks than the participant would encounter in everyday life. The study will be beneficial for the participants as students will be given the opportunity to identify certain characteristics, which could adversely impact their educational and personal environments. By identifying if students are highly likely to suffer from adult ADHD, concerted measures can be made to help future students by encouraging additional testing and resources which

could improve their daily lives. The researcher will be given the opportunity to examine the struggles which are present for online learners who are highly likely to suffer from adult ADHD so that appropriate adjustments can be made within the online classroom to help alleviate some of the issues which are present that often hinder success for this demographic.

Compensation: You will not receive payment for participation in this study.

Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher will have access to the records. I will maintain all paper research data in a locked file cabinet when not in use. All electronic files will be stored on an encrypted external USB hard drive that will also be stored in a locked file cabinet while not in use.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions: The researcher conducting this study is Freda Braddock. You may ask any questions you have now. If you have questions later, you are encouraged to contact her [REDACTED]. My chair is Dr. Shante' Moore-Austin, and her email address is [REDACTED]. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Carter 134, Lynchburg, VA 24515 or email at irb@liberty.edu.

**APPENDIX C: IRB Exemption Letter****LIBERTY UNIVERSITY.**  
INSTITUTIONAL REVIEW BOARD

October 1, 2015

Freda Braddock  
IRB Exemption 2280.100115: Adult ADHD: What is the Impact on Student Achievement within the Online Classroom?

Dear Freda,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(2), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
  - (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at [irb@liberty.edu](mailto:irb@liberty.edu).

Sincerely,

  
G. Michele Baker, MA, CIP  
Administrative Chair of Institutional Research  
The Graduate School

**LIBERTY**  
UNIVERSITY.  
*Liberty University | Training Champions for Christ since 1971*

## APPENDIX D: IRB Consent Form

The Liberty University Institutional  
Review Board has approved  
this document for use from  
10/01/15 to --  
Protocol # 2280.100115

### CONSENT FORM

#### ADULT ADHD: What is the Impact on Student Achievement within the Online Classroom?

Freda Barnett-Braddock, Principal Investigator  
Liberty University  
School of Education

You are invited to be in a research study on the impact that adult ADHD has within the online classroom. You were selected as a possible participant because you are presently enrolled, or were enrolled, in an online general education course at Liberty University. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Freda Braddock as a partial fulfillment of the requirements for the Doctor of Education degree (Ed.D.).

#### Background Information:

The purpose of this study is to examine the impact (if any) that adult Attention Deficit Hyperactivity Disorder (ADHD) has on student achievement within the online classroom.

#### Procedures:

If you agree to be in this study, I would ask you to do the following things:  
Please complete Parts I and II of the survey. A link has been provided for you. The entire survey should take less than 10 minutes to complete.

#### Risks and Benefits of being in the Study:

The study has no more risks than the participant would encounter in everyday life.

The study will be beneficial for the participants as students will be given the opportunity to identify certain characteristics, which could adversely impact their educational and personal environments. By identifying if students are highly likely to suffer from adult ADHD, concerted measures can be made to help future students by encouraging additional testing and resources which could improve their daily lives. The researcher will be given the opportunity to examine the struggles which are present for online learners who are highly likely to suffer from adult ADHD so that appropriate adjustments can be made within the online classroom to help alleviate some of the issues which are present that often hinder success for this demographic.

#### Compensation:

You will not receive payment for participation in this study.

#### Confidentiality:

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher will have access to the records.

The Liberty University Institutional  
Review Board has approved  
this document for use from  
10/01/15 to --  
Protocol # 2280.100115

I will maintain all paper research data in a locked file cabinet when not in use. All electronic files will be stored on an encrypted external USB hard drive that will also be stored in a locked file cabinet while not in use.

**Voluntary Nature of the Study:**

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

**Contacts and Questions:**

The researcher conducting this study is Freda Braddock. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [REDACTED]. My chair is Dr. Shante' Moore-Austin, and her email address is [REDACTED].

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd, Carter 134, Lynchburg, VA 24515 or email at [irb@liberty.edu](mailto:irb@liberty.edu).

*You are welcome to print a copy of this information to keep for your records.*

**Statement of Consent:**

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

Next

## APPENDIX E: Permission Letter for ASRS

7/21/2015

RE: Adult ADHD Self-Report Scale - V1.1 (ASRS-V1.1) Symptoms Checklist - Permission Requested - Outlook

Outlook Type here to search Entire Mailbox Privacy Options Sign out

Mail Reply Reply All Forward X Junk Close

**RE: Adult ADHD Self-Report Scale - V1.1 (ASRS-V1.1)  
Symptoms Checklist - Permission Requested**  
Borreliz, Avery [REDACTED]

Sent: Thursday, June 11, 2015 1:44 PM  
To: Braddock, Freda

Thank you for contacting Dr. Kessler regarding the use of the ADHD-ASRS v1.1.

Use of the ASRS is free and does not require any formal permission or approval. We do, however, ask that you please cite the below article when using the ASRS. Should you publish any work that uses the ASRS, please send us the citations to all final publications.

Kessler, R.C., Adler, L., Ames, M., Demler, O., Faraone, S., Hiripi, E., Howes, M.J., Jin, R., Secnik, K., Spencer, T., Ustun, T.B., Walters, E.E. (2005). The World Health Organization Adult ADHD Self-Report Scale (ASRS). *Psychological Medicine*, 35(2), 245-256

Should you make any amendments to the ASRS, please be sure to indicate those changes as being unique to your replication of the instrument. Please feel free to follow-up with me should you have any additional questions regarding the use of the ASRS.

Kind regards,  
Avery Borreliz

Avery Borreliz  
Project Coordinator  
Department of Health Care Policy  
Harvard Medical School  
[REDACTED]

[REDACTED]

-----Origin [REDACTED]

https://outlook.office365.com/owa/?ae=Item&id=IPM.Note&id=RgAAAAAah15o3E7aPS7EhOCFpXfPFBwBTsSyWEjOJSaWeW2%2bieowqAEoJqbnAAEjHof... 1/2

**APPENDIX F: Survey****Part I**

The purpose of Part I is to identify various factors about your current college status. Part II will give you the opportunity to rate your current behaviors and feelings to ascertain if you are having symptoms related to attention deficit hyperactivity disorder (ADHD).

1. What is your gender?
  - a. Male
  - b. Female
  
2. What is your age range?
  - a. 18-25
  - b. 26-35
  - c. 36-45
  - d. 46-55
  - e. 56 and up
  
3. What is your identified ethnicity?
  - a. Hispanic or Latino
  - b. American Indian
  - c. Indian
  - d. Black or African American
  - e. White or Caucasian
  - f. Unidentified
  
4. What is your current Grade Point Average (G.P.A.)?
  - a. 3.5 and up
  - b. 3.4-3.0
  - c. 2.9 -2.5
  - d. 2.4 -2.0
  - e. 1.9 or below
  
5. Were you enrolled last semester?
  - a. Yes
  - b. No
  
6. If so, did you complete all of your courses?
  - a. Yes
  - b. No
  - c. Not applicable



7. Did you complete the Final Exam Essay (Benchmark Assignment) for this course?

- a. Yes
- b. No
- c. Not applicable

8. If so, what was your Final Exam Essay (Benchmark Assignment) score for this course?

- a. 100 - 150
- b. 90 - 99
- c. 80 – 89
- d. 70 - 79
- e. 69 and below